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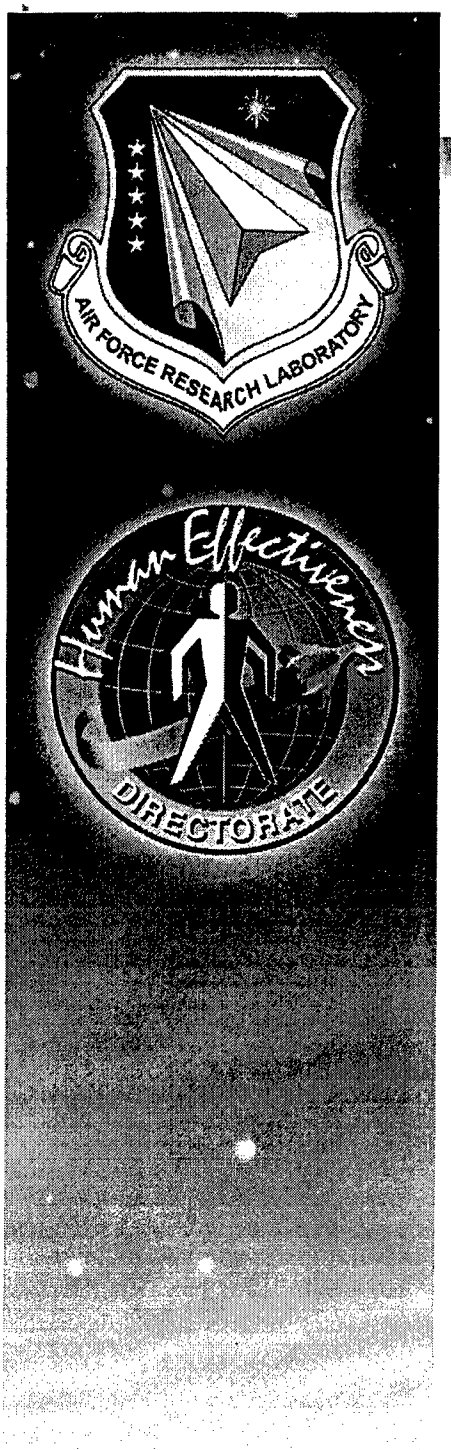

Quantification of Logistics Capabilities

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FOR THE COMMANDER

//SIGNED//

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14. ABSTRACT
The objectives of this project was to investigate the relationship between personnel skill level and mission capability (MC) and to develop an associated metric and standard. Specifically, to develop a metric that measures MC rate as a function of maintenance (MX) personnel skill levels. Once the metric was determined, a standard for this metric is identified that sets the metric value that the Air Force should strive to maintain as part of their operational goals. The relationships between MX personnel skill level and multiple utilization and reliability and maintainability performance measures are also examined. Our research methodology consisted of performing four analysis tasks for each dependent variable. The first task was to define how the variables would be used in the analysis. We identified ten independent variables measuring MX personnel skill level including the count and percentage of 3-, 5-, 7-, and 9-Level maintainers. The dependent variables that were modeled include MC rate, four utilization variables, and three reliability and maintainability variables. The second task was to perform a correlation analysis between the dependent and independent variables. Building upon the second task, the third task was to construct a set of candidate regression models for each of the dependent variables. The last task was to choose a final model for each dependent variable by examining the linear fit of the models, the efficiency of models, and adherence to model assumptions. During this analysis and selection process, it was determined that good regression models for flying hours and sorties (two of the utilization variables) could not be developed as a function of MX personnel skill level variables.

15. SUBJECT TERMS
Mission Capability, Logistics, Maintenance Personnel, Skill Level, Quantification

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Executive Summary

Oliver, et al. (2001) published research findings in the Air Force Journal of Logistics that identified the key logistic and operational factors associated with mission capability (MC). In their research, correlation analysis was performed to identify the key factors associated with MC rates and various logistical factors (such as logistic functions and personnel) and operational factors (such as funding and environment) and their associated interactions. Regression analysis was used to explain and predict F-16 MC rates using quarterly data from FY93-FY00. Personnel skill levels, cannibalization, and funding levels were found to be the most significant factors. These research findings led to the recognition that the USAF does not currently have a metric to relate maintenance (MX) personnel skill level to operational readiness.

Building upon Oliver's work, the objectives of this project are to further investigate the relationship between personnel skill level and mission capability and to develop an associated metric and standard. Specifically, a metric that measures MC rate as a function of MX personnel skill levels is developed. Once the metric was determined, a standard for this metric is identified that sets the metric value that the AF should strive to maintain as part of their operational goals. The relationships between MX personnel skill level and multiple utilization and reliability and maintainability performance measures are also examined.

Our research methodology consisted of performing four analysis tasks for each dependent variable. The first task was to define how the variables would be used in the analysis. We identified ten independent variables measuring MX personnel skill level including the count and percentage of 3-, 5-, 7-, and 9-Level maintainers. The dependent variables that were modeled include MC rate, four utilization variables, and three reliability and maintainability variables. The second task was to perform a correlation analysis between the dependent and independent

variables. Building upon the second task, the third task was to construct a set of candidate regression models for each of the dependent variables. The last task was to choose a final model for each dependent variable by examining the linear fit of the models, the efficiency of models, and adherence to model assumptions. During this analysis and selection process, it was determined that good regression models for flying hours and sorties (two of the utilization variables) could not be developed as a function of MX personnel skill level variables.

In order to demonstrate the final regression models, output has been developed into a predicted results matrix or chart to show the effect of changes in personnel levels based on the dependent variable of interest. There are three possible representations based on the number of variables in the model: a single-variable graph, a dual-variable matrix, and a triple-variable series of matrices. The model selected for MC rate contains two variables, percentage of 7-Level and 9-Level maintainers (adjusted R-Squared value of 80.7%). Therefore, the recommended metric is the percentage of 7-Level and percentage of 9-Level maintainers employed. Using the final model for MC rate, a matrix was constructed which indicates, for given personnel values, whether MC rates can be expected to meet or exceed standards for the F-16C/D airframes.

A software tool was created for the purpose of using the models in prediction scenarios. The tool has a user interface that allows the entry of possible values for personnel skill and manning levels. These values are used as inputs to the chosen regression models, and the output for each performance measure is computed at run time. The tool provides an example of the usefulness of the regression models in planning situations.

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Exhibits

Acronyms

ACC	Air Combat Control
AMC	Air Mobility Command
ASD	Average Sortie Duration
CANN	Parts Cannibalization
EIMSURS	Equipment Inventory, Multiple Status, Utilization Reporting Subsystem
FAMMAS	Funding/Availability Multi-method Allocator for Spares
FY	Flying Year
GAO	Government Accounting Office
GUI	Graphical User Interface
HQ AF/IL	Headquarters Air Force Installations and Logistics
LCOM	Logistics Composite Model
M&S	Modeling and Simulation
MAPE	Mean Absolute Percentage Error
MC	Mission Capable
MX	Maintenance
NMCM	Not Mission Capable for Maintenance
NMCS	Not Mission Capable for Supply
OPSTEMPO	Operations Tempo
PDM	Programmed Depot Maintenance
PDS	Personnel Data System
PPS	Product Performance Subsystem
REMIS	Reliability and Maintainability Information System
TNMCM	Total Not Mission Capable for Maintenance
TNMCS	Total Not Mission Capable for Supply
UTE	Utilization
VBA	Visual Basic for Applications
WUC	Work Unit Code

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1 Introduction

Oliver, et al. (2001) published research findings in the Air Force Journal of Logistics that identified the key logistic and operational factors associated with mission capability (MC). Correlation analysis was performed to identify the key factors associated with MC rates and various logistical factors (such as logistic functions and personnel) and operational factors (such as funding and environment) and their associated interactions. Regression analysis was used to explain and predict F-16 MC rates using quarterly data from FY93-FY00. Personnel skill levels, cannibalization, and funding levels were found to be the most significant factors. These research findings led to the recognition that the USAF does not currently have a metric to relate maintenance (MX) personnel skill level to operational readiness. Building upon Oliver's work, the objectives of this project are to further investigate the relationship between personnel skill level and mission capability and to develop an associated metric and standard. Specifically, a metric that measures MC rate as a function of MX personnel skill levels will be developed. One example metric could be the number of 5-level personnel per aircraft. Once a metric is determined, a standard for this metric will be developed that will set the metric value that the AF should strive to maintain as part of their operational goals. The relationships between maintenance personnel skill level and multiple utilization and reliability and maintainability performance measures will also be examined.

2 Background

Currently, the Headquarters USAF Installations and Logistics (HQ AF/IL), Air Combat Command (ACC), and Air Mobility Command (AMC) are each developing models to predict readiness rates such as MC rate, aircraft maintenance production capability, and aircraft availability (Pettingill and von Hoffman, 2004). The common goal of these models is to

augment decision making capability among logistics managers at various levels in anticipation of improved readiness. Oliver (2001) expressed concern about total readiness AF-wide as characterized by a general decrease in MC rate and increases in totally not mission capable for maintenance (NMCM) and totally not mission capable for supply (NMCS) rates.

While there are many readiness forecasting models in use by the USAF, several have gained much prominence. The Funding/Availability Multi-Method Allocator for Spares (FAMMAS) is one such forecasting model that makes use of an exponential smoothing algorithm to predict MC rates based on past values (Oliver, 2001). He also notes that while FAMMAS does well predicting MC rate based on inflation, carryover, and lead time factors, there are other logistics factors such as maintenance manning and maintenance skill levels, retention, break rates, fix rates, operations tempo, spare parts issues, and reliability and maintainability of aircraft that are not taken into account by FAMMAS.

A second readiness forecasting model that has seen much use by the USAF is the Logistics Composite Model (LCOM). LCOM uses historical data or engineered estimates to populate a Monte Carlo simulation in order to conduct weapon system capability analyses and/or determine required support resources for a given weapon system capability (AT&L Knowledge Sharing System, 2001). LCOM does not examine issues such as the effect of maintenance personnel skill levels on these forecasts.

The Mission Capable Rate and Aircraft Availability Modeling and Simulation Summit in Washington, D.C. addressed the observations of the GAO and recognized that a suitable model to predict MC rates and establish suitable goals should contain the following dependent variables: MC rate, NMCM rate, and NMCS rate. Suitable independent variables should deal with resources, funding, manpower, and programming data (Pettingill and von Hoffman, 2004).

As discussed in the next paragraph, manpower has been specifically studied many times, in order to both understand it better and quantify its effects more accurately (Howell, 1980; Garcia and Racher, 1981; Dahlman and Thaler, 2000; Oliver, et al., 2001)

Howell (1980) studied the effect of personnel skill level on sortie/mission generation and manpower requirements. Through the use of operational audits, standard times for the completion of tasks related to the maintenance of F-4 E aircraft were obtained. This data, along with failure rates obtained through USAF maintenance databases, was used to populate a simulation of a maintenance unit through LCOM. Two separate, unconstrained simulation models were run. The first was run using only 3-Level maintainers, and the other was run using only 5-Level maintainers. His study found that the 3-Levels produced only 76% of the sorties that the 5-Levels produced, and the 3-Levels took 1.34 times as many man-hours as the corresponding 5-Level simulation. Additional experimentation with a constrained model found 3-Levels actually take an average of 1.463 times as long to complete a given task. These results led to suggestions of grouping teams of 3- and 5-Level maintainers in more effective ways.

Garcia and Racher (1981) examined the effects of skill level differences within LCOM. They noted that 3-Level maintainers must frequently accomplish tasks beyond their skill level. As a result, these tasks take significantly longer than if they were performed by a 5-Level maintainer. Since LCOM fails to model this, manning requirements may be understated. Their work provides a methodology to modify LCOM to reflect differing skill levels in the completion of maintenance tasks.

Dahlman and Thaler (2000) sought to identify and quantify the value of 5- and 7-Level maintainers. Using a ratio of skilled to unskilled maintainers, a correlation analysis was

performed to examine the relationship that the ratio had on NMCM rates to emphasize the balance between skill and training.

As previously mentioned, Oliver (2001) observed that overall readiness rates had been declining over the last decade. In order to understand and curb this trend, he sought to answer several questions including: Which variables are related to mission capable rates and what are the associated relationships? What model best predicts mission capable rates and how helpful are these models in demonstrating relationships among the variables? Based on a review of related literature, he found five categories of variables potentially related to mission capable rates: personnel, environment, reliability and maintainability, funding, and operations. Specific variables related to mission capability were identified and are listed Exhibit 1.

Quarterly data was collected for each of these variables from FY93 through the end of FY00. This data was obtained through REMIS from the Equipment Inventory, Multiple Status, and Utilization Reporting System (EIMSURS) and Product Performance Subsystem (PPS) databases. Personnel variable data were acquired from the Personnel Data System (PDS).

Oliver (2001) developed a regression model to predict MC rates and demonstrated the relationship between the variables in Exhibit 1. His model seeks to identify the relationship between the identified independent variables and the dependent variable of interest, mission capability. The model then uses these relationships to predict future values of mission capability.

All variables were compared to current MC rates, as well as MC rates one to four quarters into the future. Each correlation was assessed and any correlation with less than a positive or negative correlation of 0.7 was removed from the pool of variables. Maj. Oliver also used a literature review to justify the inclusion of some variables with a low correlation value that were cited as affecting MC rates. He then removed some highly-correlated variables that

Exhibit 1: Variables related to Mission Capability

Personnel	Environment	Reliability And Maintainability	Funding	Aircraft and Logistics Operations
Personnel Assigned or Authorized	OPSTEMPO Factors	Mission Capable Hours	Spares Funding	Aircraft Utilization Rates
Number Personnel in Each Skill Level (1, 3, 5, 7, 9 and 0)	PERSTEMPO Factors	TNMCM Hours	Repair Funding	Possessed Hours
Number of Personnel in Each Grade (E1-E9)	Number of Deployments	Maintenance Downtime	General Support Funding	Average Sortie Duration
Total Number of F-16 Maintenance Personnel in various AFSCs	Policy Changes	Maintenance Reliability	Contractor Logistics Support Funding	Flying Hours
Total Number of F-16 Maintenance Personnel in various Skill Levels per AFSC		Supply Reliability	Mission Support Funding	Sorties
Total Number of F-16 Maintenance Personnel in various Grades per AFSC		Supply Downtime		Repair Cycle Time
Reenlistment Rates for F-16 Maintenance Personnel		Code 3 Breaks		Order and Ship Time
Personnel to Aircraft Ratios		TNMCS Hours		

literature indicated did not affect MC rates. The variables that passed the correlation test were subjected to multicollinearity tests. The variable that was best thought to explain the relationship in question was selected. A final correlation test was run with a linear regression analysis using each independent variable and the MC rate. The resulting coefficient of determination (R-Squared) was compared to predetermined thresholds. Variables meeting these thresholds were kept for possible use in developing forecasting models. The remaining variables were classified

into variables that can be controlled in the future and variables that cannot be controlled in the future.

Using the final pool of variables, two distinct models were constructed. One was an explanatory model that focused on examining how a set of independent variables was related to MC rates. When confined to the set of data used to construct the model, it provided very accurate predictions. However, data that was not part of the original dataset could not be used to form predictions, making it less useful for forecasting. The second model was a forecasting model, which used variables that can be controlled in the future.

The explanatory model was constructed using a technique called backward stepwise regression. All the variables in the final pool were introduced into a multiple linear regression. The variables which contribute minimally to the model were removed and the regression was run again. An F-Test was performed to verify that the forecasting model was statistically significantly different from the explanatory model. If it was, variables which contribute minimally to the model are removed and the process is repeated until the model contains only those variables which contribute to the model. Twenty percent of the dataset was randomly withheld from model construction and then used to test the results of the model and create confidence intervals for model predictions.

Using strictly the controllable variables, a forecasting model was created using multiple linear regressions. Multiple models were created and tested on the twenty percent of the data that was withheld from model development. The model with the highest degree of accuracy using the mean absolute percent error (MAPE) was selected for use.

3 Methodology

Our research methodology consisted of performing four analysis tasks for each dependent variable. The first task was to define how the variables would be used in the analysis. The second task was to perform a correlation analysis between the dependent and independent variables. The third task was the construction of regression models for each of the dependent variables. The last task was to choose a model for each dependent variable. This section gives a detailed analysis of how each task was performed and the results of each task.

3.1 Variable Definition

As our objective was to examine the relationship between personnel skill level and readiness, our first task was to select relevant independent (related to personnel skill level) and dependent (related to readiness) variables from the Oliver, et al. (2001) work. As shown in Exhibit 2, we identified ten independent variables including the count and percentage of 3-, 5-, 7-, and 9-Level maintainers. Exhibit 3 contains the dependent variables including MC rate, utilization variables, and reliability and maintainability variables. To clarify, the 3-, 5-, 7-, and 9-Level maintainers represent the amount, either count or percentage, of each level of maintainer that is available to the F-16 C/D airframe.

MC rate refers to the percentage of time that aircraft are fully or partially mission capable. Eight-hour fix rate represents the cumulative percentage of Code 3 aircraft breaks recovered within eight hours of landing. Average aircraft inventory represents the average number of assigned aircraft. Flying hours represent the number of hours flown by all F-16 C/D aircraft in each quarter. Sorties are the number of flights recorded for all F-16 C/D in each quarter. CANN hours represent the number of hours expended on cannibalization per Work Unit Code (WUC). Maintenance reliability is the number of times a WUC is coded NMCM or

partially mission capable for maintenance (PMCM). TNMCM hours are the number of hours recorded for aircraft not being mission capable for maintenance reasons (does not include PMCM hours).

Exhibit 2: Independent Variables

Independent Variables
of 3-Level Maintainers Available
of 5-Level Maintainers Available
of 7-Level Maintainers Available
of 9-Level Maintainers Available
% of 3-Level Maintainers Available
% of 5-Level Maintainers Available
% of 7-Level Maintainers Available
% of 9-Level Maintainers Available
of Crew Chiefs
of Total Maintainers Available

Exhibit 3: Dependent Variables

Dependent Variables
MC Rate
Utilization Variables
8-Hour Fix Rate
Average Aircraft Inventory
Flying Hours
Sorties
Reliability and Maintainability Variables
CANN Hours
Maintenance Reliability
TNMCM Hours

3.2 Correlation Analysis

To identify any existing linear relationships between the independent and dependent variables, a Pearson product moment correlation value was computed for each independent and dependent variable combination. Variable combinations that had a correlation value greater than 0.80 were identified as having a strong linear relationship and noted as good candidates for regression model inclusion. Exhibit 4 contains the results of the correlation analysis with strong correlations identified with bold type.

After strong correlations were identified between dependent and independent variables, another analysis was performed to determine whether the interaction of multiple independent variables had a significant correlation to the dependent variable. In order to perform this analysis each independent variable that was significantly correlated to one dependent variable, e.g. MC rate, was multiplied together. For example, MC rate had significant correlation to 7-Level and 9-Level maintainers. In order to discover if the interaction of these terms was also highly correlated, the 7-Level and 9-Level terms were multiplied together and then a Pearson product moment correlation value was calculated for the interaction term. The interaction correlations for each dependent variable are presented in Appendix A.

Exhibit 4: Correlation Results

Dependent Variables	Independent Variables				
	# of Level 3 Maintainers	**# of Level 5 Maintainers**	**# of Level 7 Maintainers**	**# of Level 9 Maintainers**	**# of Crew-Chiefs**
MC Rate	-0.620	0.738	**0.835**	**0.859**	0.051
8-hr Fix Rate	-0.530	**0.895**	**0.930**	**0.873**	0.090
Avg. Aircraft Inv.	**0.845**	-0.540	-0.739	-0.659	0.101
Flying Hours	0.385	-0.323	-0.462	-0.307	0.052
Sorties Flown	0.330	-0.272	-0.368	-0.197	0.114
CANN Hours	0.457	-0.742	**-0.813**	-0.746	-0.008
MX Reliability	0.626	-0.708	**-0.865**	-0.793	-0.101
TNMCM Hours	0.618	-0.605	-0.759	-0.770	-0.071
	% of Level 3 Maintainers	**% of Level 5 Maintainers**	**% of Level 7 Maintainers**	**% of Level 9 Maintainers**	**# of Total Maintainers**
MC Rate	**-0.838**	0.466	**0.858**	**0.847**	0.758
8-hr Fix Rate	**-0.896**	0.623	**0.862**	0.767	**0.905**
Avg. Aircraft Inv.	0.778	-0.301	**-0.902**	-0.639	-0.560
Flying Hours	0.419	-0.068	-0.552	-0.216	-0.359
Sorties Flown	0.350	-0.106	-0.426	-0.086	-0.292
CANN Hours	0.768	-0.441	-0.791	-0.659	-0.769
MX Reliability	**0.816**	-0.329	**-0.931**	-0.733	0.750
TNMCM Hours	0.739	-0.278	**-0.849**	-0.779	-0.640

3.3 Regression Modeling

This section details the regression modeling task and the results of each step in this task.

3.3.1 Regression Model Construction

The first step of regression modeling was to develop candidate regression models for each dependent variable. In order to find good candidate models, seven distinct regression techniques were identified and conducted as described in Exhibit 5. Each of these regression techniques was employed separately on two subsets of the independent variables. One subset contained percentage of each level of maintainers, number of crew chiefs, and number of total

maintainers, while the other subset contained the number of each level maintainers, number of crew chiefs, and number of total maintainers. This ensured that the percentage and count of each level of maintainers were never included in the same model in order to maintain independence.

Exhibit 5: Regression Techniques

Technique	Description
Regression 1	Multi-variate regression analysis containing all independent variables (no interactions)
Regression 2	Variation of Regression 1 containing only significant independent variables based on p-value of 0.05 or less
Regression 3	Multi-variate regression analysis containing only independent variables with a correlation coefficient of 0.8 or higher (see Exhibit 4); Interaction effects with high correlations were included (see Appendix A)
Regression 4	Variation of Regression 2 containing only significant independent variables and interactions based on p-value of 0.05 or less
Regression 5	Stepwise regression analysis starting with all independent variables (no interactions)
Regression 6	Stepwise regression analysis starting with only two and three way interactions
Regression 7	Combination of Regression 5 and Regression 6; Stepwise regression analysis starting with all independent variables and two and three way interactions

Exhibit 6 contains the resulting model from each regression technique for the MC rate dependent variable. Appendix B provides these results for the seven other dependent variables.

Exhibit 6: Regression Analysis for Mission Capable Rate

Mission Capable Rate	
Percentage of Maintainers	Number of Maintainers
Regression 1: MC Rate = 5.24 - 4.54 $x_{\%3}$ - 5.30$x_{\%5}$ - 4.01$x_{\%7}$ + 2.75$x_{\%9}$ - 0.000002x_{chiefs} + 0.000001$x_{\text{Total Maintainers}}$ R-Sq = 84.3% R-Sq(adj) = 80.5%	**Regression 1:** MC Rate = 0.729 - 0.000114$x_{\#3}$ - 0.000134$x_{\#5}$ - 0.000106$x_{\#7}$ + 0.000077$x_{\#9}$ - 0.000002x_{chiefs} + 0.000116$x_{\text{Total Maintainers}}$ R-Sq = 84.1% R-Sq(adj) = 80.3%
Regression 2: No variables were significant from Regression 1.	**Regression 2:** No variables have a p-value that are significant
Regression 3: MC Rate = 0.622 - 0.046$x_{\%3}$ + 26.7$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 79.6%	**Regression 3:** MC Rate = 0.699 + 8.63E-8 $x_{\#7}x_{\#9}$ R-Sq = 74.7% R-Sq(adj) = 73.9%
Regression 4: MC Rate = 0.607 + 27.6$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 80.2%	**Regression 4:** This regression is redundant to Regression 3.
Regression 5: MC Rate = 0.347 + 1.27 $x_{\%7}$ + 4.89 $x_{\%9}$ R-Sq = 82.0% R-Sq(adj) = 80.7%	**Regression 5:** MC Rate = 0.792 + 0.000123 $x_{\#9}$ - 0.000017$x_{\#3}$ R-Sq = 77.3% R-Sq(adj) = 75.7%
Regression 6: MC Rate = 0.639 + 42.1 $x_{\%7}x_{\%9}$ - 9.43 $x_{\%5}x_{\%9}$ R-Sq = 82.5% R-Sq(adj) = 81.3%	**Regression 6:** MC Rate = 0.650 - 6.59E -9$x_{\#3}x_{\#9}$ + 4.47E -8 $x_{\#7}x_{\#9}$ - 1.29E -12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 83.7% R-Sq(adj) = 82.0%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** MC Rate = 1.59 - 0.00236 $x_{\#9}$ - 4.68E-5 $x_{\#5}$ + 1.85E-7 $x_{\#7}x_{\#9}$ + 1.14E-7 $x_{\#5}x_{\#9}$ - 8.2E-12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 86.6% R-Sq(adj) = 84.0%

3.3.2 Regression Model Selection

The regression model construction step resulted in multiple candidate models for each dependent variable. The need arose to select the best model for each dependent variable by examining the linear fit of the models, the efficiency of models, and adherence to model assumptions.

The first step was to examine the linear fit of each candidate model. Any candidate model that did not result in a fit parameter (adjusted R-Squared value) of 0.64 or greater was eliminated from further consideration. Examination of adjusted R-Squared values given for each candidate model (Appendix B) shows that this fit criteria reduced the number of candidate models from 82 to 60. This criterion also determined that no candidate models provided a good fit for the flying hours and sorties dependent variables. This result suggests that factors other

than personnel skill level are influencing these two performance measures, and therefore flying hours and sorties were eliminated from further analysis.

The next criterion used to select the final models was model efficiency. Here efficiency is defined as how well the model fit the data (adjusted R-Squared) given the number of variable inputs needed to obtain this fit (independent variable terms). Efficient frontiers for each of the six remaining dependent variables were developed by graphing the adjusted R-Squared value versus the number of variable terms for each remaining candidate model. Dominant models, or those models that lie on the efficient frontier, are identified as those models which achieve a better or equal adjusted R-squared value as the other models with more variable terms. A summary of all candidate models with a fit criteria greater than 0.64 are shown in Exhibit 7. Models that lie on the efficient frontiers are indicated with bold type. This resulted in identification of the most efficient models for each dependent variable and reduced the number of candidate models from 62 to 18 as shown in Exhibit 8.

Exhibit 7: Adjusted R-Squared Values for Efficiency Analysis

Dependent Variables	# of Independent Variable Terms					
	1	2	3	4	5	6
MC Rate		0.802 **0.807** 0.739 0.757	**0.84** 0.813 0.796	0.82		0.805 0.803
8 Hour Fix Rate	0.813 **0.861**	0.861 0.857	0.859 **0.863** 0.859	0.847		0.842 0.84
Average Aircraft Inventory	**0.808** 0.704		0.92 **0.943**	0.932	0.973 **0.982** 0.973	0.917 0.941
CANN Hours	**0.649**	**0.65** 0.649	0.651 0.647 0.694		**0.746**	0.665 0.669
MX Reliability	**0.861**	**0.886** 0.859 0.87 0.88 0.883 0.872	**0.891** 0.74	**0.901**		0.894 0.898
TNMCM Hours	**0.711**		0.792 0.792 **0.794**	0.776	0.794	0.779 0.774 **0.854**

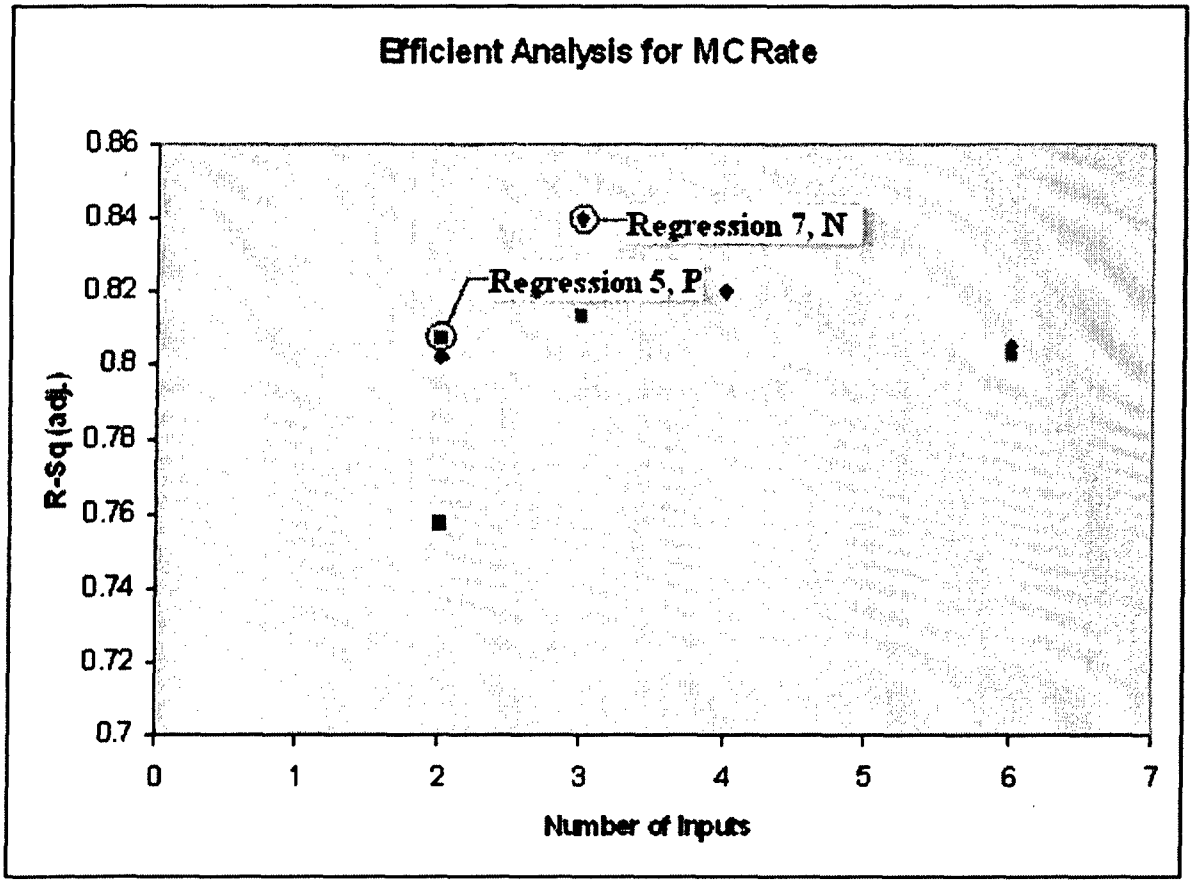
A summary of the efficiency analysis is given in Exhibit 8. An abbreviated naming scheme for the candidate models was developed as the Regression analysis technique number, Type of skill level data (P = percentage of and N = number of). For example, a candidate model developed for percentage of skill level data using Regression 5 technique is titled Regression 5, P.

Exhibit 8: Efficient Frontier Models for each Dependent Variable

Dependent Variable	Efficient Frontier Models
MC Rate	Regression 5, P Regression 7, N
8 Hour Fix Rate	Regression 5, N Regression 6, P
Average Aircraft Inventory	Regression 3, P Regression 5, N Regression 6, N
Cannibalization Hours	Regression 3, N Regression 5, P Regression 7, N Regression 6, N
Maintenance Reliability	Regression 2, P Regression 2, N Regression 4, P Regression 7, P
TNMCM Hours	Regression 3, P Regression 6, P Regression 7, N

Exhibit 9 presents the efficiency analysis graph for MC rate. Here we can see that candidate models, Regression 5, P and Regression 7, N, lie on the efficient frontier as they dominate the other eight models. Appendix C contains the efficiency analysis graphs for all six remaining dependent variables.

Exhibit 9: Efficient Analysis for MC rate



The third criterion used to identify the final models was whether or not the efficient models for each dependent variable met the four common linear regression assumptions. These assumptions are (1) the error term, ε, has a zero mean, (2) the error term, ε, has constant variance, (3) the errors are uncorrelated, and (4) the errors are normally distributed. A description of how each of these assumptions was tested is provided in Exhibit 10.

Exhibit 10: Assumption Test Description

Assumption	Test Description
ε has zero mean	One-sample t-test where H_0: The sum of the residuals = 0; models failed this assumption if their p-value was less than 0.95.
ε has constant variance	The residuals were ordered according to the value of the predicted values of the variable being modeled. The residuals were then halved and a 2-sample t-test was performed where H_0: variances are equal. If the resultant p-value was less than 0.05, it failed this assumption.
Errors are uncorrelated	Each residual (r_j) was compared to the next r_{j+1} residual by computing a correlation value. Correlation coefficients of 0.80 or higher failed this assumption.
Errors are normally distributed	Ryan-Joiner test for normality where p-values less than 0.05 failed this assumption.

Exhibit 11 contains the results of each assumption test for the efficient models. Results that failed to meet the assumption criteria are indicated in bold type. Any models that did not meet all four of the assumptions were removed from consideration as final recommended models. This decreased the number of candidate models from 18 to 15.

Exhibit 11: Assumption Test Results

Dependent Variable	Model	1-Sample t test (p-value)	Ryan-Joiner Test (p-value) *(Residual Normality)*	Correlation Coefficient for error terms	2-Sample t test (p-value)
MC Rate	Regression 5, P	1.000	> 0.100	0.48	0.697
	Regression 7, N	1.000	> 0.100	0.198	0.412
8 Hour Fix Rate	Regression 5, N	1.000	> 0.100	-0.241	0.680
	Regression 6, P	1.000	> 0.100	-0.256	0.733
Average Aircraft Inventory	Regression 3, P	1.000	0.070	**0.889**	**0.048**
	Regression 5, N	1.000	> 0.100	0.504	0.430
	Regression 6, N	1.000	> 0.100	0.199	0.477
CANN Hours	Regression 3, N	1.000	> 0.100	0.373	0.168
	Regression 5, P	1.000	> 0.100	0.370	0.167
	Regression 6, N	1.000	> 0.100	0.337	0.313
	Regression 7, N	1.000	> 0.100	0.188	0.452
Maintenance Reliability	Regression 2, P	1.000	> 0.100	0.216	0.873
	Regression 2, N	1.000	> 0.100	0.204	**0.044**
	Regression 4, P	1.000	> 0.100	0.239	0.675
	Regression 7, P	1.000	> 0.100	-0.102	0.429
TNMCM Hours	Regression 3, P	1.000	**0.021**	0.493	0.816
	Regression 6, P	1.000	0.087	0.151	0.732
	Regression 7, N	1.000	0.050	0.332	0.470

3.3.3 Final Model Identification

A final model was chosen based on the results presented in Section 4.3.2. The last criterion enforced in identifying final models was avoiding the use of interaction terms when the other model criteria were similar. The final models for the six remaining dependent variables are presented in Exhibit 12.

Exhibit 12: Final Models

Dependent Variable	Final Model
MC Rate	MC Rate = 0.347 + 1.27 $x_{\%7}$ + 4.89 $x_{\%9}$ R-Sq = 82.0% R-Sq(adj) = 80.7%
8-Hour Fix Rate	8 Hour fix rate = 0.441 + 0.000040 $x_{\#7}$ R-Sq = 86.5% R-Sq(adj) = 86.1%
Average Aircraft Inventory	Average Aircraft Inventory = 760 + 0.0624 $x_{\#3}$ + 0.0363 $x_{\#5}$ - 0.0736 $x_{\#7}$ R-Sq = 94.9% R-Sq(adj) = 94.3%
CANN Hours	CANN Hours = 33857 - 2.49 $x_{\#7}$ R-Sq = 66.0% R-Sq(adj) = 64.9%
Maintenance Reliability	Maintenance Reliability = 24947 - 72293 $x_{\%7}$ R-Sq = 86.6% R-Sq(adj) = 86.1%
TNMCM Hours	TNMCM hours = - 178625 - 0.0366 $x_{\#7}x_{\#9}$ + 41.7 $x_{\#5}$ R-Sq = 80.7% R-Sq(adj) = 79.4%

Exhibit 13 gives a summary of each regression model developed for MC rate. The key to the syntax and coding of the dependent variable model is in Exhibit 14. Regression model summaries of the six remaining dependent variables are provided in Appendix D. The complete statistical software output for all regression analyses are provided in Appendix E.

Exhibit 13: Regression Modeling Summary for MC Rate

Percentage of Maintainers	Number of Maintainers
Regression 1: MC Rate = 5.24 - 4.54 $x_{\%3}$ - 5.30$x_{\%5}$ - 4.01$x_{\%7}$ + 2.75$x_{\%9}$ - 0.000002x_{Chiefs} + 0.000001$x_{Total\ Maintainers}$ R-Sq = 84.3% R-Sq(adj) = 80.5%	**Regression 1:** MC Rate = 0.729 - 0.000114$x_{\#3}$ - 0.000134$x_{\#5}$ - 0.000106$x_{\#7}$ + 0.000077$x_{\#9}$ - 0.000002x_{Chiefs} + 0.000116$x_{Total\ Maintainers}$ R-Sq = 84.1% R-Sq(adj) = 80.3%
Regression 2: No variables were significant from Regression 1.	**Regression 2:** No variables have a p-value that are significant
Regression 3: MC Rate = 0.622 - 0.046$x_{\%3}$ + 26.7$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 79.6%	**Regression 3:** MC Rate = 0.699 + 8.63E-8 $x_{\#7}x_{\#9}$ R-Sq = 74.7% R-Sq(adj) = 73.9%
Regression 4: MC Rate = 0.607 + 27.6$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 80.2%	**Regression 4:** This regression is redundant to Regression 3.
Regression 5: CHOSEN MODEL MC Rate = 0.347 + 1.27 $x_{\%7}$ + 4.89 $x_{\%9}$ R-Sq = 82.0% R-Sq(adj) = 80.7%	**Regression 5:** MC Rate = 0.792 + 0.000123 $x_{\#9}$ - 0.000017$x_{\#3}$ R-Sq = 77.3% R-Sq(adj) = 75.7%
Regression 6: MC Rate = 0.639 + 42.1 $x_{\%7}x_{\%5}$ - 9.43 $x_{\%5}x_{\%9}$ R-Sq = 82.5% R-Sq(adj) = 81.3%	**Regression 6:** MC Rate = 0.650 - 6.59E -9$x_{\#3}x_{\#9}$ + 4.47E -8 $x_{\#7}x_{\#9}$ - 1.29E -12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 83.7% R-Sq(adj) = 82.0%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** MC Rate = 1.59 - 0.00236 $x_{\#9}$ - 4.68E-5 $x_{\#5}$ + 1.85E-7 $x_{\#7}x_{\#9}$ + 1.14E-7 $x_{\#5}x_{\#9}$ - 8.2E-12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 86.6% R-Sq(adj) = 84.0%

Exhibit 14: Model Explanation Key

Variables:

$x_{\%3}$ =	Percentage of level 3 maintainers
$x_{\%5}$ =	Percentage of level 5 maintainers
$x_{\%7}$ =	Percentage of level 7 maintainers
$x_{\%9}$ =	Percentage of level 9 maintainers
$x_{\#3}$ =	Number of level 3 maintainers
$x_{\#5}$ =	Number of level 5 maintainers
$x_{\#7}$ =	Number of level 7 maintainers
$x_{\#9}$ =	Number of level 9 maintainers
x_{Chiefs} =	Number of Crew Chiefs
$x_{Total\ Maintainers}$ =	Number of Total Maintainers

* Any variables that appear together (ex: $x_{\#7}x_{\#9}$) are the interactions of those variables.

& Any regression models that return an R-Squared (adj) of less than 0.64 are taken out of consideration and have strikethrough text to show this. (Ex. ~~R-Sq = 50.6% R-Sq(adj) = 38.7%~~)

Color Code:

Regressions appearing in this color box are not effective, efficient models
Regressions appearing in this color box are effective, efficient models

Check Boxes:

The check boxes give a summary of the assumption analysis.
If the check box is checked then the model passed the test for that assumption.
The check boxes appear in order of the assumption tests.

The first check box is for the test to verify that the error terms have a zero mean.
The second check box is for the test to verify that the error terms have a normal distribution.
The third check box is for the test to verify that the error terms are uncorrelated.
The forth check box is for the test to verify that the error terms have constant error variance.

4 Results

In order to demonstrate the final regression models, output has been developed into a predicted results matrix or chart to show the effect of changes in personnel levels based on the dependent variable of interest. There are three possible representations based on the number of variables in the model: a single-variable graph, a dual-variable matrix, and a triple-variable series of matrices. These do not contain every feasible formulation of performance measures, just a possible range as based upon the Oliver (2001) dataset.

4.1 Mission Capable Rate

The model selected for MC rate contains two variables, percentage of 7-Level and 9-Level maintainers. As part of the project mandate, a metric and standard for evaluating MC rate as a function of personnel skill level was developed. The metric is the percentage of 7-Level and percentage of 9-Level maintainers employed. The standard will be discussed later. For this reason, the results for MC rate are more involved than subsequent dependent variables. Exhibit 15 shows a color-coded depiction of the predicted MC rate for the total range of possible combinations of the percentage of 7-Level and 9-Level maintainers. They are coded as follows: red signifies an invalid input region such as 100 percent 7-Levels and 20 percent 9-Levels; blue signifies an invalid MC rate (over 100 percent); light green represents a valid region and valid MC rate; dark green represents a valid region and valid MC rate which is over the USAF standard of 84 percent.

Exhibit 15: Range of values for Mission Capable rate

All possibilities matrix											
	% Level 9										
% Level 7	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%	60.00%	70.00%	80.00%	90.00%	100.00%
0.00%	34.70%	83.60%	132.50%	181.40%	230.30%	279.20%	328.10%	377.00%	425.90%	474.80%	523.70%
10.00%	47.40%	[illegible]	145.20%	194.10%	243.00%	291.90%	340.80%	389.70%	438.60%	487.50%	
20.00%	60.10%	109.00%	157.90%	206.80%	255.70%	304.60%	353.50%	402.40%	451.30%		
30.00%	72.80%	121.70%	170.60%	219.50%	268.40%	317.30%	366.20%	415.10%			
40.00%	[illegible]	134.40%	183.30%	232.20%	281.10%	330.00%	378.90%				
50.00%	[illegible]	147.10%	196.00%	244.90%	293.80%	342.70%					
60.00%	110.90%	159.80%	208.70%	257.60%	306.50%						
70.00%	123.60%	172.50%	221.40%	270.30%							
80.00%	136.30%	185.20%	234.10%								
90.00%	149.00%	197.90%									
100.00%	161.70%										

KEY	
	Valid Region and Valid MC Rate near Observed Values where MC Rate prediction is above desired threshold of 84%
	Valid Region and Valid MC Rate near Observed Values
	Valid Region and Valid MC Rate above desired threshold of 84%
	Valid Region and Valid MC Rate
	Valid Region and Invalid MC Rate
	Invalid Region

Exhibit 16 is a magnified area of the previous Exhibit 15. Additional color-coding is that light yellow signifies a valid region and a valid MC Rate that was within the observed data values. In

other words, the light yellow region contains the range of values that do not violate extrapolation rules.

Exhibit 16: Magnified range of possible values for Mission Capable rate

	% Level 9												
% Level 7	0.00%	1.00%	2.00%	3.00%	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%	11.00%	12.00%
0.00%	34.70%	39.59%	44.48%	49.37%	54.26%	59.15%	64.04%	68.93%	73.82%	78.71%	83.60%	88.49%	93.38%
1.00%	35.97%	40.86%	45.75%	50.64%	55.53%	60.42%	65.31%	70.20%	75.09%	79.98%	84.87%	89.76%	94.65%
2.00%	37.24%	42.13%	47.02%	51.91%	56.80%	61.69%	66.58%	71.47%	76.36%	81.25%	86.14%	91.03%	95.92%
3.00%	38.51%	43.40%	48.29%	53.18%	58.07%	62.96%	67.85%	72.74%	77.63%	82.52%	87.41%	92.30%	97.19%
4.00%	39.78%	44.67%	49.56%	54.45%	59.34%	64.23%	69.12%	74.01%	78.90%	83.79%	88.68%	93.57%	98.46%
5.00%	41.05%	45.94%	50.83%	55.72%	60.61%	65.50%	70.39%	75.28%	80.17%	85.06%	89.95%	94.84%	99.73%
6.00%	42.32%	47.21%	52.10%	56.99%	61.88%	66.77%	71.66%	76.55%	81.44%	86.33%	91.22%	96.11%	101.00%
7.00%	43.59%	48.48%	53.37%	58.26%	63.15%	68.04%	72.93%	77.82%	82.71%	87.60%	92.49%	97.38%	102.27%
8.00%	44.86%	49.75%	54.64%	59.53%	64.42%	69.31%	74.20%	79.09%	83.98%	88.87%	93.76%	98.65%	103.54%
9.00%	46.13%	51.02%	55.91%	60.80%	65.69%	70.58%	75.47%	80.36%	85.25%	90.14%	95.03%	99.92%	104.81%
10.00%	47.40%	52.29%	57.18%	62.07%	66.96%	71.85%	76.74%	81.63%	86.52%	91.41%	96.30%	101.19%	106.08%
11.00%	48.67%	53.56%	58.45%	63.34%	68.23%	73.12%	78.01%	82.90%	87.79%	92.68%	97.57%	102.46%	107.35%
12.00%	49.94%	54.83%	59.72%	64.61%	69.50%	74.39%	79.28%	84.17%	89.06%	93.95%	98.84%	103.73%	108.62%
13.00%	51.21%	56.10%	60.99%	65.88%	70.77%	75.66%	80.55%	85.44%	90.33%	95.22%	100.11%	105.00%	109.89%
14.00%	52.48%	57.37%	62.26%	67.15%	72.04%	76.93%	81.82%	86.71%	91.60%	96.49%	101.38%	106.27%	111.16%
15.00%	53.75%	58.64%	63.53%	68.42%	73.31%	78.20%	83.09%	87.98%	92.87%	97.76%	102.65%	107.54%	112.43%
16.00%	55.02%	59.91%	64.80%	69.69%	74.58%	79.47%	84.36%	89.25%	94.14%	99.03%	103.92%	108.81%	113.70%
17.00%	56.29%	61.18%	66.07%	70.96%	75.85%	80.74%	85.63%	90.52%	95.41%	100.30%	105.19%	110.08%	114.97%
18.00%	57.56%	62.45%	67.34%	72.23%	77.12%	82.01%	86.90%	91.79%	96.68%	101.57%	106.46%	111.35%	116.24%
19.00%	58.83%	63.72%	68.61%	73.50%	78.39%	83.28%	88.17%	93.06%	97.95%	102.84%	107.73%	112.62%	117.51%
20.00%	60.10%	64.99%	69.88%	74.77%	79.66%	84.55%	89.44%	94.33%	99.22%	104.11%	109.00%	113.89%	118.78%
21.00%	61.37%	66.26%	71.15%	76.04%	80.93%	85.82%	90.71%	95.60%	100.49%	105.38%	110.27%	115.16%	120.05%
22.00%	62.64%	67.53%	72.42%	77.31%	82.20%	87.09%	91.98%	96.87%	101.76%	106.65%	111.54%	116.43%	121.32%
23.00%	63.91%	68.80%	73.69%	78.58%	83.47%	88.36%	93.25%	98.14%	103.03%	107.92%	112.81%	117.70%	122.59%
24.00%	65.18%	70.07%	74.96%	79.85%	84.74%	89.63%	94.52%	99.41%	104.30%	109.19%	114.08%	118.97%	123.86%
25.00%	66.45%	71.34%	76.23%	81.12%	86.01%	90.90%	95.79%	100.68%	105.57%	110.46%	115.35%	120.24%	125.13%
26.00%	67.72%	72.61%	77.50%	82.39%	87.28%	92.17%	97.06%	101.95%	106.84%	111.73%	116.62%	121.51%	126.40%
27.00%	68.99%	73.88%	78.77%	83.66%	88.55%	93.44%	98.33%	103.22%	108.11%	113.00%	117.89%	122.78%	127.67%
28.00%	70.26%	75.15%	80.04%	84.93%	89.82%	94.71%	99.60%	104.49%	109.38%	114.27%	119.16%	124.05%	128.94%
29.00%	71.53%	76.42%	81.31%	86.20%	91.09%	95.98%	100.87%	105.76%	110.65%	115.54%	120.43%	125.32%	130.21%
30.00%	72.80%	77.69%	82.58%	87.47%	92.36%	97.25%	102.14%	107.03%	111.92%	116.81%	121.70%	126.59%	131.48%
31.00%	74.07%	78.96%	83.85%	88.74%	93.63%	98.52%	103.41%	108.30%	113.19%	118.08%	122.97%	127.86%	132.75%
32.00%	75.34%	80.23%	85.12%	90.01%	94.90%	99.79%	104.68%	109.57%	114.46%	119.35%	124.24%	129.13%	134.02%
33.00%	76.61%	81.50%	86.39%	91.28%	96.17%	101.06%	105.95%	110.84%	115.73%	120.62%	125.51%	130.40%	135.29%
34.00%	77.88%	82.77%	87.66%	92.55%	97.44%	102.33%	107.22%	112.11%	117.00%	121.99%	126.78%	131.67%	136.56%
35.00%	79.15%	84.04%	88.93%	93.82%	98.71%	103.60%	108.49%	113.38%	118.27%	123.16%	128.05%	132.94%	137.83%
36.00%	80.42%	85.31%	90.20%	95.09%	99.98%	104.87%	109.76%	114.65%	119.54%	124.43%	129.32%	134.21%	139.10%
37.00%	81.69%	86.58%	91.47%	96.36%	101.25%	106.14%	111.03%	115.92%	120.81%	125.70%	130.59%	135.48%	140.37%
38.00%	82.96%	87.85%	92.74%	97.63%	102.52%	107.41%	112.30%	117.19%	122.08%	126.97%	131.86%	136.75%	141.64%
39.00%	84.23%	89.12%	94.01%	98.90%	103.79%	108.68%	113.57%	118.46%	123.35%	128.24%	133.13%	138.02%	142.91%
40.00%	85.50%	90.39%	95.28%	100.17%	105.06%	109.95%	114.84%	119.73%	124.62%	129.51%	134.40%	139.29%	144.18%
41.00%	86.77%	91.66%	96.55%	101.44%	106.33%	111.22%	116.11%	121.00%	125.89%	130.78%	135.67%	140.56%	145.45%
42.00%	88.04%	92.93%	97.82%	102.71%	107.60%	112.49%	117.38%	122.27%	127.16%	132.05%	136.94%	141.83%	146.72%
43.00%	89.31%	94.20%	99.09%	103.98%	108.87%	113.76%	118.65%	123.54%	128.43%	133.32%	138.21%	143.10%	147.99%
44.00%	90.58%	95.47%	100.36%	105.25%	110.14%	115.03%	119.92%	124.81%	129.70%	134.59%	139.48%	144.37%	149.26%
45.00%	91.85%	96.74%	101.63%	106.52%	111.41%	116.30%	121.19%	126.08%	130.97%	135.86%	140.75%	145.64%	150.53%
46.00%	93.12%	98.01%	102.90%	107.79%	112.68%	117.57%	122.46%	127.35%	132.24%	137.13%	142.02%	146.91%	151.80%
47.00%	94.39%	99.28%	104.17%	109.06%	113.95%	118.84%	123.73%	128.62%	133.51%	138.40%	143.29%	148.18%	153.07%
48.00%	95.66%	100.55%	105.44%	110.33%	115.22%	120.11%	125.00%	129.89%	134.78%	139.67%	144.56%	149.45%	154.34%
49.00%	96.93%	101.82%	106.71%	111.60%	116.49%	121.38%	126.27%	131.16%	136.05%	140.94%	145.83%	150.72%	155.61%
50.00%	98.20%	103.09%	107.98%	112.87%	117.76%	122.65%	127.54%	132.43%	137.32%	142.21%	147.10%	151.99%	156.88%
51.00%	99.47%	104.36%	109.25%	114.14%	119.03%	123.92%	128.81%	133.70%	138.59%	143.48%	148.37%	153.26%	158.15%
52.00%	100.74%	105.63%	110.52%	115.41%	120.30%	125.19%	130.08%	134.97%	139.86%	144.75%	149.64%	154.53%	159.42%

Exhibit 17 is a magnified view of the valid region and valid MC Rate area denoted by light yellow in Exhibit 16. Additional dark yellow coding has been added to represent observed value ranges that produce a MC rate above 84 percent. Exhibit 17 provides examination into the

standards that the USAF should maintain for the percentage of 7-Level and 9-Level maintainers to ensure that their MC rate does not fall below 84 percent.

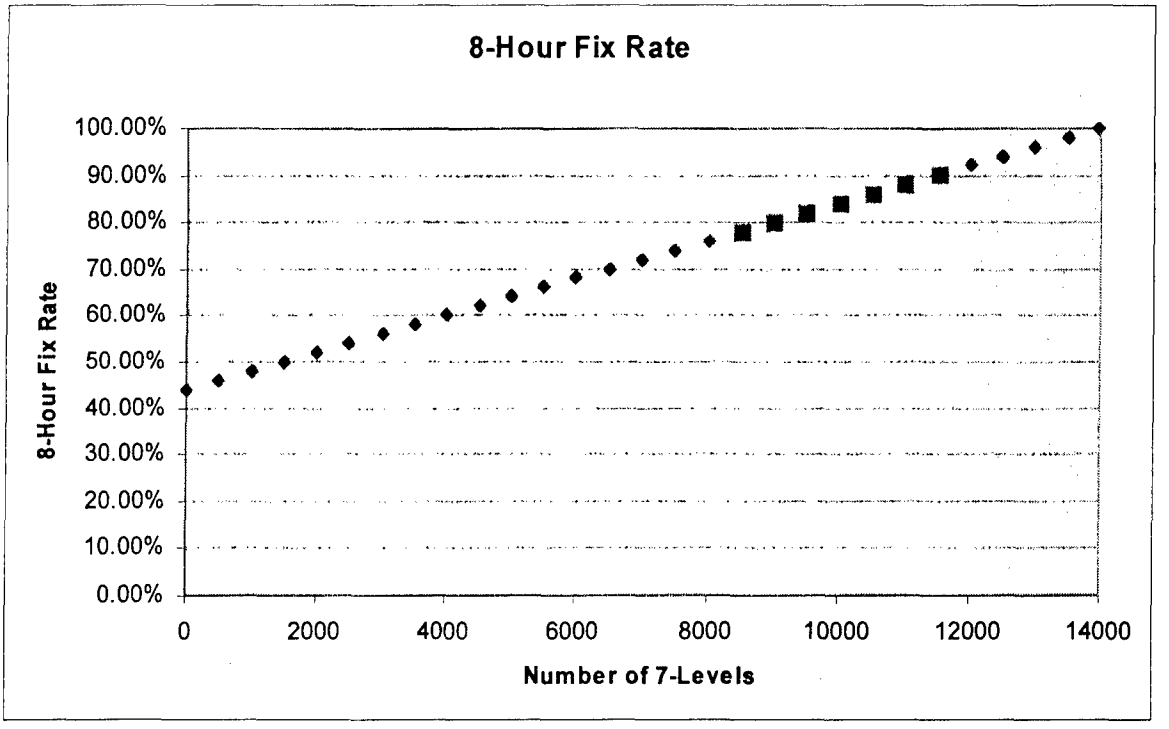
Exhibit 17: Range of possible values for MC rate within observed values

	% Level 9				
% Level 7	2.25%	2.50%	2.75%	3.00%	3.25%
23.00%	74.91%	76.14%	77.36%	78.58%	79.80%
24.00%	76.18%	77.41%	78.63%	79.85%	81.07%
25.00%	77.45%	78.68%	79.90%	81.12%	82.34%
26.00%	78.72%	79.95%	81.17%	82.39%	83.61%
27.00%	79.99%	81.22%	82.44%	83.66%	84.88%

4.2 8-Hour Fix Rate

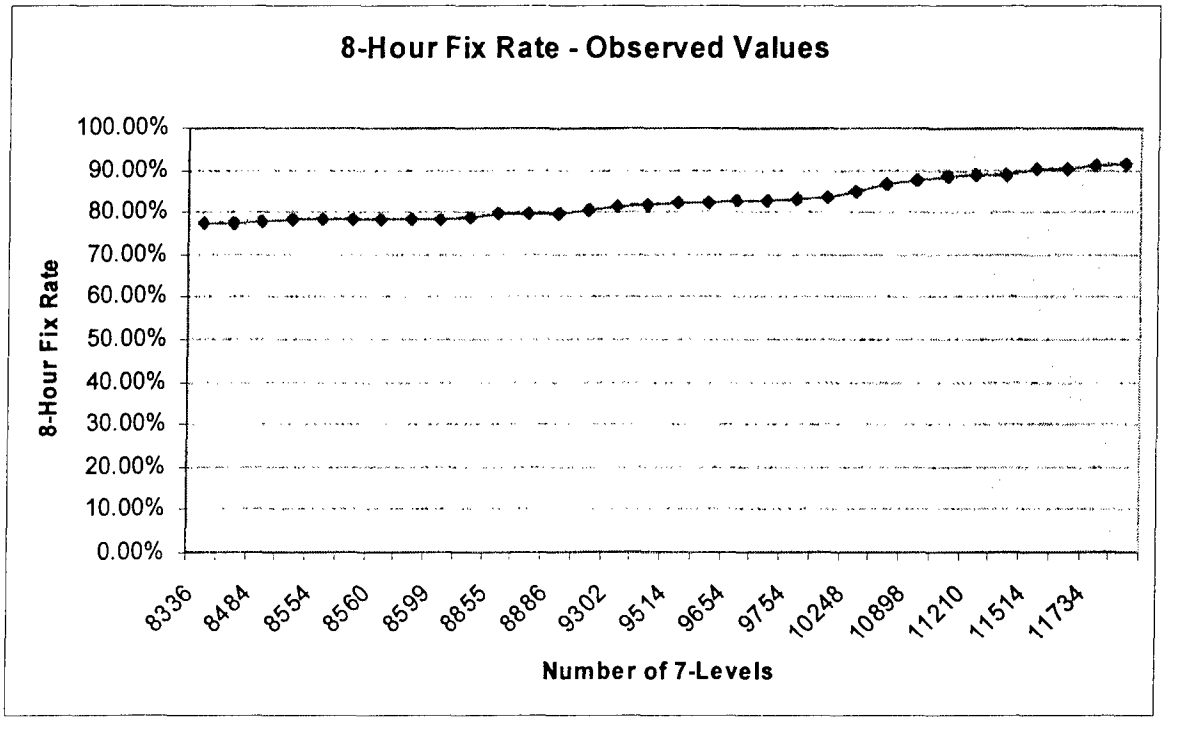
The final model for 8-Hour Fix Rate contains a single independent variable, the number of 7-Level maintainers. Exhibit 18 displays this positive linear relationship with an increasing number of 7-Level maintainers increasing the 8-Hour Fix Rate. Those values that fall within the observed data range are depicted by square red markers.

Exhibit 18: Total range of possible values for 8-Hour Fix Rate



The range of observed values is magnified in Exhibit 19.

Exhibit 19: Observed range of possible values for 8-Hour Fix Rate



4.3 Average Aircraft Inventory

Average aircraft inventory contains three independent variables in the final model. For this reason, it is portrayed in a series of matrices as shown in Exhibit 20. The uppermost value is the value of 3-Levels, the columns represent 5-Levels, and the rows represent 7-Levels. There are five matrices representing five different values for 3-Levels. The area in light yellow represents ranges of values that are within those observed in the data.

Exhibit 20: Ranges of possible values for Average Aircraft Inventory

3-Level	6500													
5-Level	17000	17500	18000	18500	19000	19500	20000	20500	21000	21500	22000	22500	23000	23500
8000	1193.9	1212.05	1230.2	1248.35	1266.5	1284.65	1302.8	1320.95	1339.1	1357.25	1375.4	1393.55	1411.7	1429.85
8500	1157.1	1175.25	1193.4	1211.55	1229.7	1247.85	1266	1284.15	1302.3	1320.45	1338.6	1356.75	1374.9	1393.05
9000	1120.3	1138.45	1156.6	1174.75	1192.9	1211.05	1229.2	1247.35	1265.5	1283.65	1301.8	1319.95	1338.1	1356.25
9500	1083.5	1101.65	1119.8	1137.95	1156.1	1174.25	1192.4	1210.55	1228.7	1246.85	1265	1283.15	1301.3	1319.45
10000	1046.7	1064.85	1083	1101.15	1119.3	1137.45	1155.6	1173.75	1191.9	1210.05	1228.2	1246.35	1264.5	1282.65
10500	1009.9	1028.05	1046.2	1064.35	1082.5	1100.65	1118.8	1136.95	1155.1	1173.25	1191.4	1209.55	1227.7	1245.85
11000	973.1	991.25	1009.4	1027.55	1045.7	1063.85	1082	1100.15	1118.3	1136.45	1154.6	1172.75	1190.9	1209.05
11500	936.3	954.45	972.6	990.75	1008.9	1027.05	1045.2	1063.35	1081.5	1099.65	1117.8	1135.95	1154.1	1172.25
12000	899.5	917.65	935.8	953.95	972.1	990.25	1008.4	1026.55	1044.7	1062.85	1081	1099.15	1117.3	1135.45

7-Level

3-Level	7000													
5-Level	17000	17500	18000	18500	19000	19500	20000	20500	21000	21500	22000	22500	23000	23500
8000	1225.1	1243.25	1261.4	1279.55	1297.7	1315.85	1334	1352.15	1370.3	1388.45	1406.6	1424.75	1442.9	1461.05
8500	1188.3	1206.45	1224.6	1242.75	1260.9	1279.05	1297.2	1315.35	1333.5	1351.65	1369.8	1387.95	1406.1	1424.25
9000	1151.5	1169.65	1187.8	1205.95	1224.1	1242.25	1260.4	1278.55	1296.7	1314.85	1333	1351.15	1369.3	1387.45
9500	1114.7	1132.85	1151	1169.15	1187.3	1205.45	1223.6	1241.75	1259.9	1278.05	1296.2	1314.35	1332.5	1350.65
10000	1077.9	1096.05	1114.2	1132.35	1150.5	1168.65	1186.8	1204.95	1223.1	1241.25	1259.4	1277.55	1295.7	1313.85
10500	1041.1	1059.25	1077.4	1095.55	1113.7	1131.85	1150	1168.15	1186.3	1204.45	1222.6	1240.75	1258.9	1277.05
11000	1004.3	1022.45	1040.6	1058.75	1076.9	1095.05	1113.2	1131.35	1149.5	1167.65	1185.8	1203.95	1222.1	1240.25
11500	967.5	985.65	1003.8	1021.95	1040.1	1058.25	1076.4	1094.55	1112.7	1130.85	1149	1167.15	1185.3	1203.45
12000	930.7	948.85	967	985.15	1003.3	1021.45	1039.6	1057.75	1075.9	1094.05	1112.2	1130.35	1148.5	1166.65

7-Level

3-Level	7500													
5-Level	17000	17500	18000	18500	19000	19500	20000	20500	21000	21500	22000	22500	23000	23500
8000	1256.3	1274.45	1292.6	1310.75	1328.9	1347.05	1365.2	1383.35	1401.5	1419.65	1437.8	1455.95	1474.1	1492.25
8500	1219.5	1237.65	1255.8	1273.95	1292.1	1310.25	1328.4	1346.55	1364.7	1382.85	1401	1419.15	1437.3	1455.45
9000	1182.7	1200.85	1219	1237.15	1255.3	1273.45	1291.6	1309.75	1327.9	1346.05	1364.2	1382.35	1400.5	1418.65
9500	1145.9	1164.05	1182.2	1200.35	1218.5	1236.65	1254.8	1272.95	1291.1	1309.25	1327.4	1345.55	1363.7	1381.85
10000	1109.1	1127.25	1145.4	1163.55	1181.7	1199.85	1218	1236.15	1254.3	1272.45	1290.6	1308.75	1326.9	1345.05
10500	1072.3	1090.45	1108.6	1126.75	1144.9	1163.05	1181.2	1199.35	1217.5	1235.65	1253.8	1271.95	1290.1	1308.25
11000	1035.5	1053.65	1071.8	1089.95	1108.1	1126.25	1144.4	1162.55	1180.7	1198.85	1217	1235.15	1253.3	1271.45
11500	998.7	1016.85	1035	1053.15	1071.3	1089.45	1107.6	1125.75	1143.9	1162.05	1180.2	1198.35	1216.5	1234.65
12000	961.9	980.05	998.2	1016.35	1034.5	1052.65	1070.8	1088.95	1107.1	1125.25	1143.4	1161.55	1179.7	1197.85

7-Level

3-Level	8000													
5-Level	17000	17500	18000	18500	19000	19500	20000	20500	21000	21500	22000	22500	23000	23500
8000	1287.5	1305.65	1323.8	1341.95	1360.1	1378.25	1396.4	1414.55	1432.7	1450.85	1469	1487.15	1505.3	1523.45
8500	1250.7	1268.85	1287	1305.15	1323.3	1341.45	1359.6	1377.75	1395.9	1414.05	1432.2	1450.35	1468.5	1486.65
9000	1213.9	1232.05	1250.2	1268.35	1286.5	1304.65	1322.8	1340.95	1359.1	1377.25	1395.4	1413.55	1431.7	1449.85
9500	1177.1	1195.25	1213.4	1231.55	1249.7	1267.85	1286	1304.15	1322.3	1340.45	1358.6	1376.75	1394.9	1413.05
10000	1140.3	1158.45	1176.6	1194.75	1212.9	1231.05	1249.2	1267.35	1285.5	1303.65	1321.8	1339.95	1358.1	1376.25
10500	1103.5	1121.65	1139.8	1157.95	1176.1	1194.25	1212.4	1230.55	1248.7	1266.85	1285	1303.15	1321.3	1339.45
11000	1066.7	1084.85	1103	1121.15	1139.3	1157.45	1175.6	1193.75	1211.9	1230.05	1248.2	1266.35	1284.5	1302.65
11500	1029.9	1048.05	1066.2	1084.35	1102.5	1120.65	1138.8	1156.95	1175.1	1193.25	1211.4	1229.55	1247.7	1265.85
12000	993.1	1011.25	1029.4	1047.55	1065.7	1083.85	1102	1120.15	1138.3	1156.45	1174.6	1192.75	1210.9	1229.05

7-Level

3-Level	8500													
5-Level	17000	17500	18000	18500	19000	19500	20000	20500	21000	21500	22000	22500	23000	23500
8000	1318.7	1336.85	1355	1373.15	1391.3	1409.45	1427.6	1445.75	1463.9	1482.05	1500.2	1518.35	1536.5	1554.65
8500	1281.9	1300.05	1318.2	1336.35	1354.5	1372.65	1390.8	1408.95	1427.1	1445.25	1463.4	1481.55	1499.7	1517.85
9000	1245.1	1263.25	1281.4	1299.55	1317.7	1335.85	1354	1372.15	1390.3	1408.45	1426.6	1444.75	1462.9	1481.05
9500	1208.3	1226.45	1244.6	1262.75	1280.9	1299.05	1317.2	1335.35	1353.5	1371.65	1389.8	1407.95	1426.1	1444.25
10000	1171.5	1189.65	1207.8	1225.95	1244.1	1262.25	1280.4	1298.55	1316.7	1334.85	1353	1371.15	1389.3	1407.45
10500	1134.7	1152.85	1171	1189.15	1207.3	1225.45	1243.6	1261.75	1279.9	1298.05	1316.2	1334.35	1352.5	1370.65
11000	1097.9	1116.05	1134.2	1152.35	1170.5	1188.65	1206.8	1224.95	1243.1	1261.25	1279.4	1297.55	1315.7	1333.85
11500	1061.1	1079.25	1097.4	1115.55	1133.7	1151.85	1170	1188.15	1206.3	1224.45	1242.6	1260.75	1278.9	1297.05
12000	1024.3	1042.45	1060.6	1078.75	1096.9	1115.05	1133.2	1151.35	1169.5	1187.65	1205.8	1223.95	1242.1	1260.25

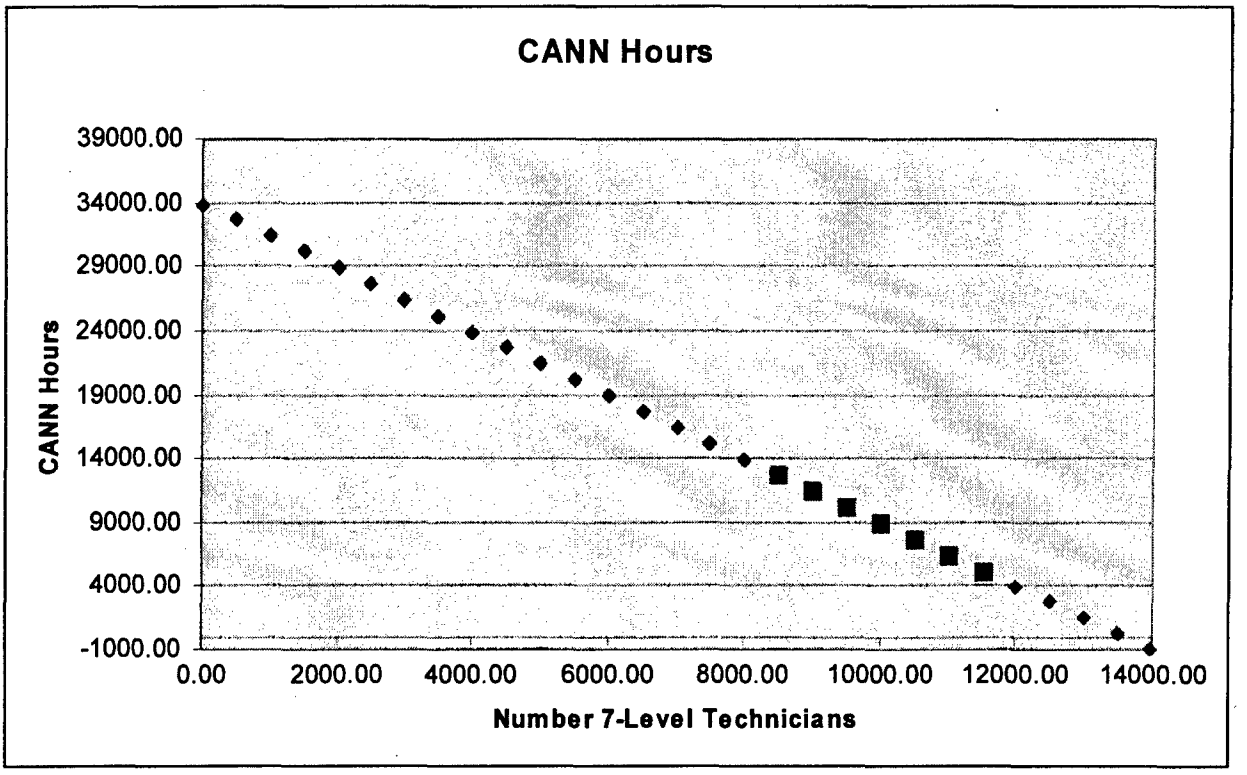
7-Level

4.4 CANN Hours

CANN Hours was found to be a function of a single independent variable, the number of 7-Level maintainers. CANN hours has a linearly decreasing value with additional 7-Level

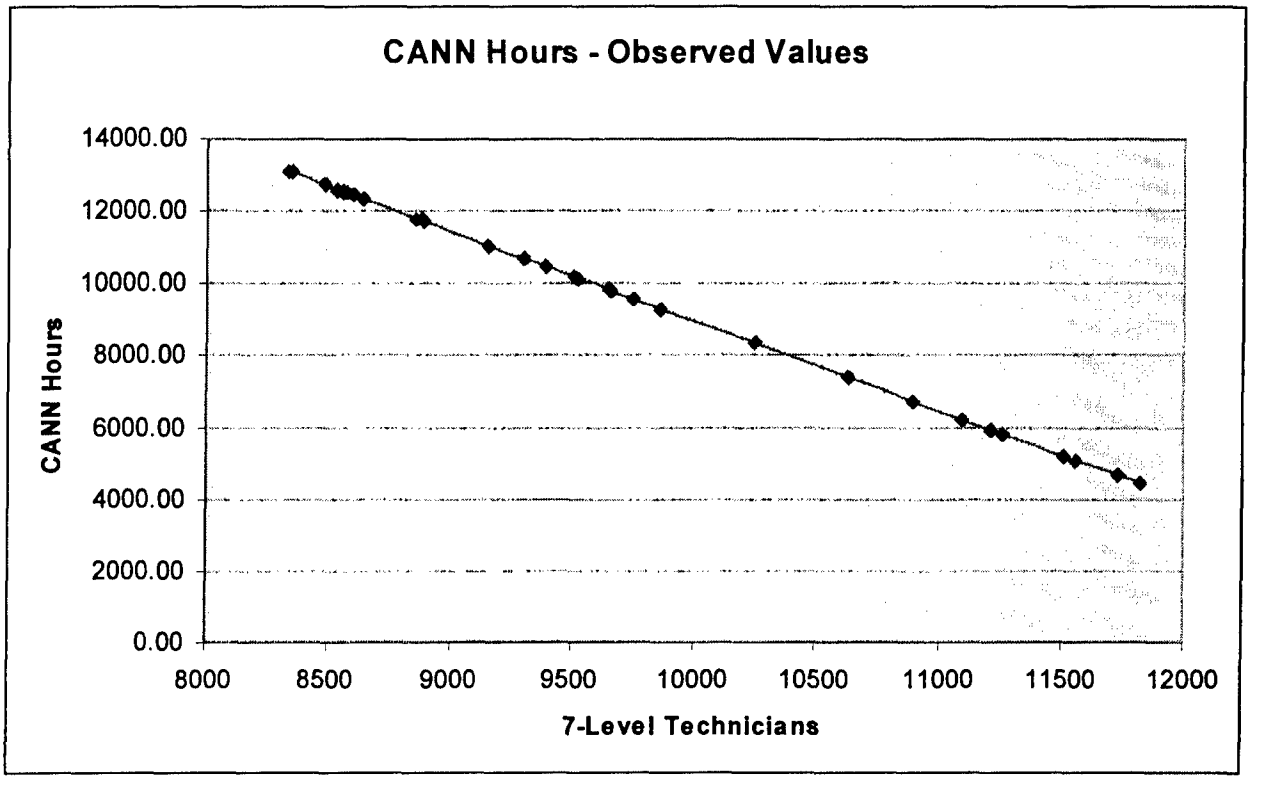
maintainers. As in the case of 8-Hour Fix Rate, those values within the observed range are denoted with a red square in Exhibit 21.

Exhibit 21: Possible range of CANN Hours



The figure can be magnified to include only values within the observed range as shown in Exhibit 22.

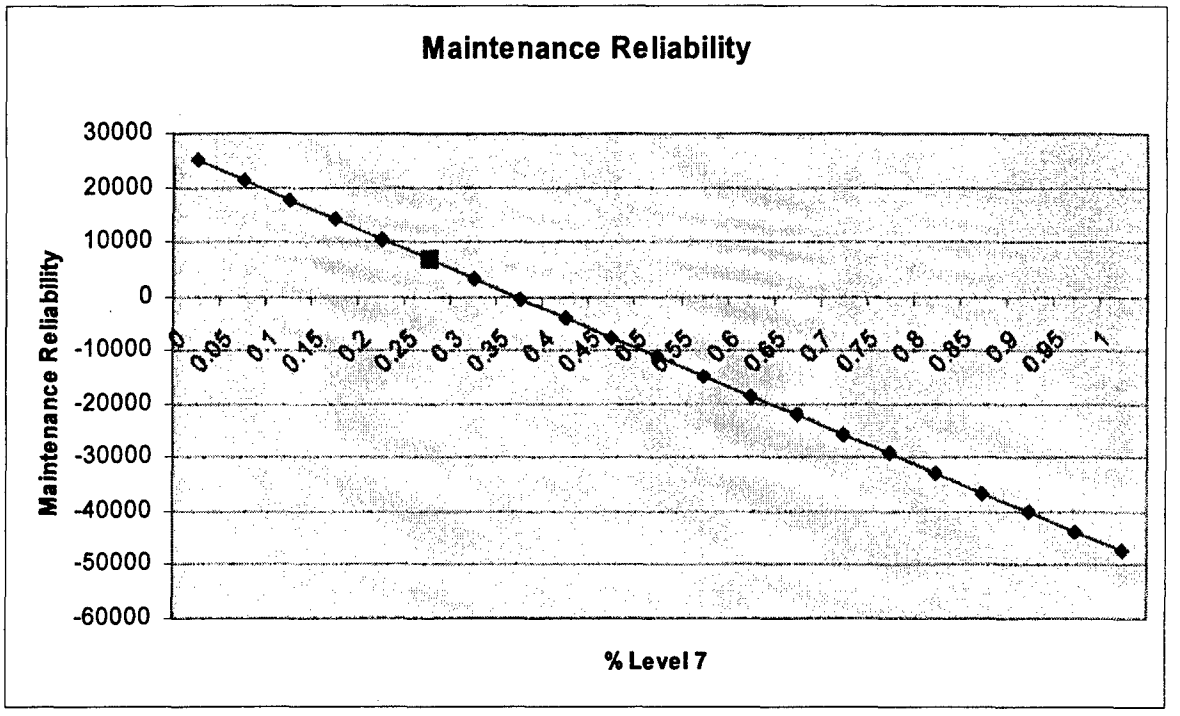
Exhibit 22: Observed range of possible values for CANN Hours



4.5 Maintenance Reliability

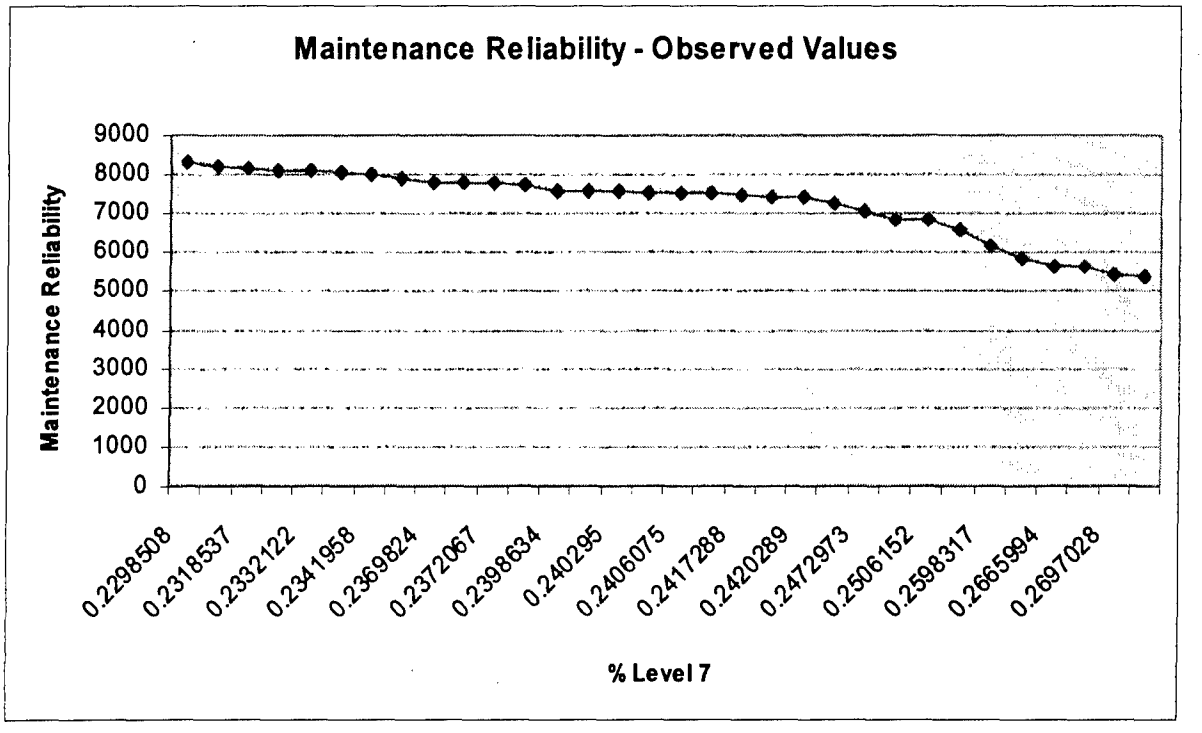
The final model for maintenance reliability contains a single predictor, the percentage of 7-Level maintainers. Maintenance reliability was found to have decreasing value with the additional increase of percentage of 7-Level maintainers. As in the previous examples, the observed data range has been denoted by red squares Exhibit 23.

Exhibit 23: Total range of possible values for Maintenance Reliability



Due to the very tight range of observed values, these have been graphed separately in Exhibit 24 to show the linearly decreasing relationship.

Exhibit 24: Observed range of values for Maintenance Reliability



4.6 Total Not Mission Capable for Maintenance Hours

As is the case in average aircraft inventory, the final model for TNMCM is a multiple linear regression containing three variables and is therefore set up in a multiple matrix format. The top variable is number of 9-Levels, while the number of 7-Levels is across the columns and the number of 5-Levels is along the rows. Exhibits 25 – 27 portray the possible range of TNMCM values with those being within the observed range of values shaded in light yellow.

Exhibit 25: Possible range of values for TNMCM

9-Levels	800								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	296035	281395	266755	252115	237475	222835	208195	193555	178915
17500	316885	302245	287605	272965	258325	243685	229045	214405	199765
18000	337735	323095	308455	293815	279175	264535	249895	235255	220615
18500	358585	343945	329305	314665	300025	285385	270745	256105	241465
19000	379435	364795	350155	335515	320875	306235	291595	276955	262315
19500	400285	385645	371005	356365	341725	327085	312445	297805	283165
20000	421135	406495	391855	377215	362575	347935	333295	318655	304015
20500	441985	427345	412705	398065	383425	368785	354145	339505	324865
21000	462835	448195	433555	418915	404275	389635	374995	360355	345715
21500	483685	469045	454405	439765	425125	410485	395845	381205	366565
22000	504535	489895	475255	460615	445975	431335	416695	402055	387415
22500	525385	510745	496105	481465	466825	452185	437545	422905	408265
23000	546235	531595	516955	502315	487675	473035	458395	443755	429115
23500	567085	552445	537805	523165	508525	493885	479245	464605	449965

5-Levels

9-Levels	900								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	266755	250285	233815	217345	200875	184405	167935	151465	134995
17500	287605	271135	254665	238195	221725	205255	188785	172315	155845
18000	308455	291985	275515	259045	242575	226105	209635	193165	176695
18500	329305	312835	296365	279895	263425	246955	230485	214015	197545
19000	350155	333685	317215	300745	284275	267805	251335	234865	218395
19500	371005	354535	338065	321595	305125	288655	272185	255715	239245
20000	391855	375385	358915	342445	325975	309505	293035	276565	260095
20500	412705	396235	379765	363295	346825	330355	313885	297415	280945
21000	433555	417085	400615	384145	367675	351205	334735	318265	301795
21500	454405	437935	421465	404995	388525	372055	355585	339115	322645
22000	475255	458785	442315	425845	409375	392905	376435	359965	343495
22500	496105	479635	463165	446695	430225	413755	397285	380815	364345
23000	516955	500485	484015	467545	451075	434605	418135	401665	385195
23500	537805	521335	504865	488395	471925	455455	438985	422515	406045

5-Levels

Exhibit 26: Possible range of values for TNMCM (cont.)

9-Levels	1000								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	237475	219175	200875	182575	164275	145975	127675	109375	91075
17500	258325	240025	221725	203425	185125	166825	148525	130225	111925
18000	279175	260875	242575	224275	205975	187675	169375	151075	132775
18500	300025	281725	263425	245125	226825	208525	190225	171925	153625
19000	320875	302575	284275	265975	247675	229375	211075	192775	174475
19500	341725	323425	305125	286825	268525	250225	231925	213625	195325
20000	362575	344275	325975	307675	289375	271075	252775	234475	216175
20500	383425	365125	346825	328525	310225	291925	273625	255325	237025
21000	404275	385975	367675	349375	331075	312775	294475	276175	257875
21500	425125	406825	388525	370225	351925	333625	315325	297025	278725
22000	445975	427675	409375	391075	372775	354475	336175	317875	299575
22500	466825	448525	430225	411925	393625	375325	357025	338725	320425
23000	487675	469375	451075	432775	414475	396175	377875	359575	341275
23500	508525	490225	471925	453625	435325	417025	398725	380425	362125

5-Levels

9-Levels	1100								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	208195	188065	167935	147805	127675	107545	87415	67285	47155
17500	229045	208915	188785	168655	148525	128395	108265	88135	68005
18000	249895	229765	209635	189505	169375	149245	129115	108985	88855
18500	270745	250615	230485	210355	190225	170095	149965	129835	109705
19000	291595	271465	251335	231205	211075	190945	170815	150685	130555
19500	312445	292315	272185	252055	231925	211795	191665	171535	151405
20000	333295	313165	293035	272905	252775	232645	212515	192385	172255
20500	354145	334015	313885	293755	273625	253495	233365	213235	193105
21000	374995	354865	334735	314605	294475	274345	254215	234085	213955
21500	395845	375715	355585	335455	315325	295195	275065	254935	234805
22000	416695	396565	376435	356305	336175	316045	295915	275785	255655
22500	437545	417415	397285	377155	357025	336895	316765	296635	276505
23000	458395	438265	418135	398005	377875	357745	337615	317485	297355
23500	479245	459115	438985	418855	398725	378595	358465	338335	318205

5-Levels

Exhibit 27: Possible range of values for TNMCM (cont.)

9-Levels	1200								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	178915	156955	134995	113035	91075	69115	47155	25195	3235
17500	199765	177805	155845	133885	111925	89965	68005	46045	24085
18000	220615	198655	176695	154735	132775	110815	88855	66895	44935
18500	241465	219505	197545	175585	153625	131665	109705	87745	65785
19000	262315	240355	218395	196435	174475	152515	130555	108595	86635
19500	283165	261205	239245	217285	195325	173365	151405	129445	107485
20000	304015	282055	260095	238135	216175	194215	172255	150295	128335
20500	324865	302905	280945	258985	237025	215065	193105	171145	149185
21000	345715	323755	301795	279835	257875	235915	213955	191995	170035
21500	366565	344605	322645	300685	278725	256765	234805	212845	190885
22000	387415	365455	343495	321535	299575	277615	255655	233695	211735
22500	408265	386305	364345	342385	320425	298465	276505	254545	232585
23000	429115	407155	385195	363235	341275	319315	297355	275395	253435
23500	449965	428005	406045	384085	362125	340165	318205	296245	274285

5-Levels

9-Levels	1300								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	149635	125845	102055	78265	54475	30685	6895	-16895	-40685
17500	170485	146695	122905	99115	75325	51535	27745	3955	-19835
18000	191335	167545	143755	119965	96175	72385	48595	24805	1015
18500	212185	188395	164605	140815	117025	93235	69445	45655	21865
19000	233035	209245	185455	161665	137875	114085	90295	66505	42715
19500	253885	230095	206305	182515	158725	134935	111145	87355	63565
20000	274735	250945	227155	203365	179575	155785	131995	108205	84415
20500	295585	271795	248005	224215	200425	176635	152845	129055	105265
21000	316435	292645	268855	245065	221275	197485	173695	149905	126115
21500	337285	313495	289705	265915	242125	218335	194545	170755	146965
22000	358135	334345	310555	286765	262975	239185	215395	191605	167815
22500	378985	355195	331405	307615	283825	260035	236245	212455	188665
23000	399835	376045	352255	328465	304675	280885	257095	233305	209515
23500	420685	396895	373105	349315	325525	301735	277945	254155	230365

5-Levels

9-Levels	1400								
7-Levels	8000	8500	9000	9500	10000	10500	11000	11500	12000
17000	530275	530275	530275	530275	530275	530275	530275	530275	530275
17500	551125	551125	551125	551125	551125	551125	551125	551125	551125
18000	571975	571975	571975	571975	571975	571975	571975	571975	571975
18500	592825	592825	592825	592825	592825	592825	592825	592825	592825
19000	613675	613675	613675	613675	613675	613675	613675	613675	613675
19500	634525	634525	634525	634525	634525	634525	634525	634525	634525
20000	655375	655375	655375	655375	655375	655375	655375	655375	655375
20500	676225	676225	676225	676225	676225	676225	676225	676225	676225
21000	697075	697075	697075	697075	697075	697075	697075	697075	697075
21500	717925	717925	717925	717925	717925	717925	717925	717925	717925
22000	738775	738775	738775	738775	738775	738775	738775	738775	738775
22500	759625	759625	759625	759625	759625	759625	759625	759625	759625
23000	780475	780475	780475	780475	780475	780475	780475	780475	780475
23500	801325	801325	801325	801325	801325	801325	801325	801325	801325

5-Levels

5 Skill Rate Tool

One of the deliverables is a computer tool to aid in the application of the final regression models. This tool was created in Microsoft EXCEL® using Visual Basic for Applications (VBA). The program operates through a menu-driven Graphical User Interface (GUI). It has been designated the Skill Rate Tool and will be referred to by this designation. The Skill Rate Tool contains the final regression models for six dependent variables modeled in this project: MC rate, 8-hour fix rate, average aircraft inventory, CANN Hours, Maintenance Reliability, and TNMCM hours. Values for these regressions are obtained through the GUI in two ways: 1) the user can toggle a series of slider bars which represent personnel skill level percentages, or 2) the user can directly input personnel skill level percentages into a series of text boxes. The user must also enter values for the total number of crew chiefs and the total number of maintainers. As each value is changed, the Skill Rate Tool dynamically updates the values for the six dependent variables to demonstrate their performance as functions of the final models.

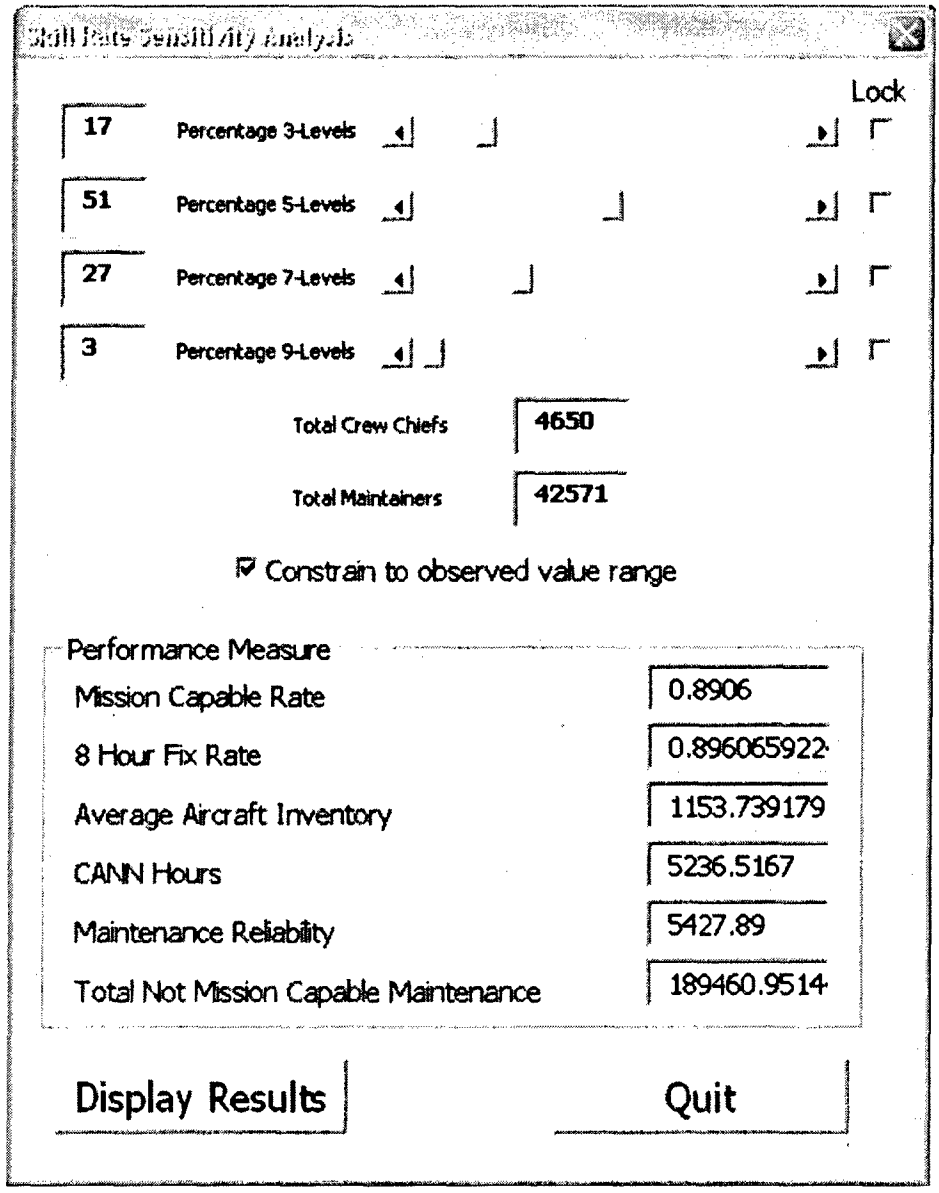
5.1 Using the Skill Rate Tool

To begin using the Skill Rate Tool, load the accompanying EXCEL® file. After the file has loaded, be sure that macros are enabled. Depending on the pre-set security levels, the macros function may not be enabled. To enable macros, load EXCEL®. Click on the menu bar labeled Tools. Scroll down to and click Macro. Shift right and click Security. Choose either Medium or Low Security. If Medium Security is chosen, when the Skill Rate Tool is loaded, a screen will ask whether to enable or disable macros, choose enable.

Once EXCEL® has been loaded, the only spreadsheet visible will contain a button that reads "Run Analysis". Click this button to load the Skill Rate Tool. Upon loading, there will be a GUI with the caption Skill Rate Sensitivity Analysis above it. The Skill Rate Tool loads with

the following preset: all variables are constrained to the actual observed range of values seen from the dataset. This prevents extrapolation i.e. the use of regression models to predict values that are outside the range of values used to form the regression models. This feature can be disabled by clicking on the Constrain check box. For later reference, the Skill Rate Tool GUI is presented in Exhibit 28.

Exhibit 28: Skill Rate Tool GUI Sample



As stated earlier, there are two ways to input any of the skill level percentages, through direct entry or slider bar. The Skill Rate Tool has been coded to allow entry using either. When inputs are entered in the text boxes, they are checked to ensure that they are numerical, integer, and between 0 and 100 (if percentages). If entries are not in this format, an error will occur and the previous value in the text box will appear. Entries that are in the proper format will be processed. Any value that causes the total percentage to be over 100 percent will cause a reduction algorithm to be run. The reduction algorithm decreases the values of the other personnel percentages until the total percentage is 100 percent or less. The reduction algorithm checks for several cases. If the lock check box is clicked, it will not reduce the corresponding personnel percentage. If the percentage is 0, then it will not be reduced. If the constrain check box is clicked and the percentage value is equal to the lower limit, it will not be reduced. The algorithm cycles through each of the personnel percentages, beginning at the 3-Level personnel. If none of the personnel percentages can be reduced, the personnel value that was changed initially is reduced to a level such that the total percentage is 100 percent. The same procedure is followed when changing the slider bars. Each personnel level has an associated lock check box. When this is checked, the value cannot be changed.

Once an acceptable skill level distribution has been obtained, the Display Results button should be clicked. This function outputs the variable levels and the corresponding performance level values to a spreadsheet. From here, these values can be used in other pertinent operations. If these values need to be modified, the Skill Rate Tool can be reloaded using the attached button.

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Appendix A

Interactions

Percentage of experience levels

	Factors	*Correlation*	*P-value*
MC Rate			
	% of level 3's and level 7's	-0.725	0.000
	% of level 3's and level 9's	-0.043	0.815
	% of level 7's and level 9's	0.899	0.000
	% of level 3's, 7's and 9's	0.624	0.000
8 Hour Fix Rate			
	% of level 3's and level 7's	-0.807	0.000
	% of level 3's and total maintainers	-0.530	0.002
	% of level 7's and total maintainers	0.930	0.000
	% of level 3's, 7's and total maintainers	0.350	0.050
Maintenance Reliability			
	% of level 3's and level 7's	0.649	0.000

Total number of each level of maintainers

MC Rate			
	# of level 7's and level 9's	0.864	0.000
8 Hour Fix Rate			
	# of level 5's and level 7's	0.926	0.000
	# of level 5's and level 9's	0.914	0.000
	# of level 5's and total maintainers	0.903	0.000
	# of level 7's and level 9's	0.914	0.000
	# of level 7's and total maintainers	0.926	0.000
	# of level 9's and total maintainers	0.902	0.000
	# of level 5's, 7's, 9's	0.921	0.000
	# of level 5's, 7's, Total Maintainers	0.921	0.000
	# of level 5's, 9's, and Total Maintainers	0.912	0.000

Appendix B

Mission Capable Rate	
Percentage of Maintainers	Number of Maintainers
Regression 1: MC Rate = 5.24 - 4.54 $x_{\%3}$ - 5.30$x_{\%5}$ - 4.01$x_{\%7}$ + 2.75$x_{\%9}$ - 0.000002x_{chiefs} + 0.000001$x_{Total\ Maintainers}$ R-Sq = 84.3% R-Sq(adj) = 80.5%	**Regression 1:** MC Rate = 0.729 - 0.000114$x_{\#3}$ - 0.000134$x_{\#5}$ - 0.000106$x_{\#7}$ + 0.000077$x_{\#9}$ - 0.000002x_{chiefs} + 0.000116$x_{Total\ Maintainers}$ R-Sq = 84.1% R-Sq(adj) = 80.3%
Regression 2: No variables were significant from Regression 1.	**Regression 2:** No variables have a p-value that are significant
Regression 3: MC Rate = 0.622 - 0.046$x_{\%3}$ + 26.7$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 79.6%	**Regression 3:** MC Rate = 0.699 + 8.63E-8 $x_{\#7}x_{\#9}$ R-Sq = 74.7% R-Sq(adj) = 73.9%
Regression 4: MC Rate = 0.607 + 27.6$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 80.2%	**Regression 4:** This regression is redundant to Regression 3.
Regression 5: MC Rate = 0.347 + 1.27 $x_{\%7}$ + 4.89 $x_{\%9}$ R-Sq = 82.0% R-Sq(adj) = 80.7%	**Regression 5:** MC Rate = 0.792 + 0.000123 $x_{\#9}$ - 0.000017$x_{\#3}$ R-Sq = 77.3% R-Sq(adj) = 75.7%
Regression 6: MC Rate = 0.639 + 42.1 $x_{\%7}x_{\%9}$ - 9.43 $x_{\%5}x_{\%9}$ R-Sq = 82.5% R-Sq(adj) = 81.3%	**Regression 6:** MC Rate = 0.650 - 6.59E -9$x_{\#3}x_{\#9}$ + 4.47E -8 $x_{\#7}x_{\#9}$ - 1.29E -12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 83.7% R-Sq(adj) = 82.0%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** MC Rate = 1.59 - 0.00236 $x_{\#9}$ - 4.68E-5 $x_{\#5}$ + 1.85E-7 $x_{\#7}x_{\#9}$ + 1.14E-7 $x_{\#5}x_{\#9}$ - 8.2E-12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 86.6% R-Sq(adj) = 84.0%

8-Hour Fix Rate	
Percentage of Maintainers	Number of Maintainers
Regression 1: 8 Hour fix rate = 1.94 - 2.06 $x_{\%3}$ - 1.71 $x_{\%5}$ - 0.58 $x_{\%7}$- 2.47 $x_{\%9}$ - 0.000001 x_{chiefs} + 0.000009 $x_{Total\ Maintainers}$ R-Sq = 87.3% R-Sq(adj) = 84.2%	**Regression 1:** 8 Hour fix rate = 0.443 - 0.000056 $x_{\#3}$ - 0.000048 $x_{\#5}$ - 0.000023 $x_{\#7}$ - 0.000058 $x_{\#9}$ - 0.000001 x_{chiefs} + 0.000052 $x_{Total\ Maintainers}$ R-Sq = 87.1% R-Sq(adj) = 84.0%
Regression 2: 8 Hour fix rate = 0.228 + 0.000015 $x_{Total\ Maintainers}$ R-Sq = 81.9% R-Sq(adj) = 81.3%	**Regression 2:** No variables have a p-value that are significant
Regression 3: 8 Hour fix rate = 0.547 - 1.47 $x_{\%3}x_{\%7}$ + 0.000036 $x_{\%7}x_{Total\ Maintainers}$ R-Sq = 86.8% R-Sq(adj) = 85.9%	**Regression 3:** 8 Hour fix rate = 0.395 - 0.000000 $x_{\#5}x_{\#7}$ + 0.000000 $x_{\#5}x_{\#9}$ + 0.000000 $x_{\#5}x_{Total\ Maintainers}$ + 0.000000 $x_{\#7}x_{Total\ Maintainers}$ - 0.000000 $x_{\#9}x_{Total\ Maintainers}$ - 0.000000 $x_{\#5}x_{\#7}x_{\#9}x_{TM}$ R-Sq = 87.7% R-Sq(adj) = 84.7%
Regression 4: 8 Hour fix rate = 0.441 + 0.000040 $x_{\%7}x_{Total\ Maintainers}$ R-Sq = 86.5% R-Sq(adj) = 86.1%	**Regression 4:** No variables have a p-value that are significant
Regression 5: 8 Hour fix rate = 0.0539 + 0.000010 $x_{Total\ Maintainers}$ + 1.53 $x_{\%7}$ R-Sq = 86.7% R-Sq(adj) = 85.7%	**Regression 5:** 8 Hour fix rate = 0.441 + 0.000040 $x_{\#7}$ R-Sq = 86.5% R-Sq(adj) = 86.1%
Regression 6: 8 Hour fix rate = 0.474 + 0.000072 $x_{\%5}x_{\%7}x_{Total\ Maintainers}$ R-Sq = 86.7% R-Sq(adj) = 86.3%	**Regression 6:** 8 Hour fix rate = 0.462 + 3.82E-9 $x_{\#5}x_{\#7}$ - 4.90E-14 $x_{\#5}x_{\#7}x_{Total\ Maintainers}$ R-Sq = 86.8% R-Sq(adj) = 85.9%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** This regression is redundant to Regression 5.

Average Aircraft Inventory	
Percentage of Maintainers	*Number of Maintainers*
Regression 1: Average Aircraft Inventory = - 984 + 3671 $x_{\%3}$ + 2757 $x_{\%5}$ - 1801 $x_{\%7}$ + 1704 $x_{\%9}$ + 0.00826 x_{chiefs} + 0.0120 $x_{Total\ Maintainers}$ R-Sq = 93.3% R-Sq(adj) = 91.7%	**Regression 1:** Average Aircraft Inventory = 757 + 0.0889 $x_{\#3}$ + 0.0671 $x_{\#5}$ - 0.0408 $x_{\#7}$ + 0.0171 $x_{\#9}$ + 0.00763 x_{chiefs} - 0.0302 $x_{Total\ Maintainers}$ R-Sq = 95.3% R-Sq(adj) = 94.1%
Regression 2: Average Aircraft Inventory = 1657 - 0.0100 $x_{Total\ Maintainers}$ R-Sq = 31.3% R-Sq(adj) = 29.1%	**Regression 2:** No variables have a p-value that are significant
Regression 3: Average Aircraft Inventory = 2228 - 3947 $x_{\%7}$ R-Sq = 81.4% R-Sq(adj) = 80.8%	**Regression 3:** Average Aircraft Inventory = 383 + 0.111 $x_{\#3}$ R-Sq = 71.4% R-Sq(adj) = 70.4%
Regression 4: This regression is redundant to Regression 3.	**Regression 4:** This regression is redundant to Regression 3
Regression 5: Average Aircraft Inventory = 1626 - 4685 $x_{\%7}$ + 0.0134 $x_{Total\ Maintainers}$ + 1249 $x_{\%3}$ R-Sq = 92.8% R-Sq(adj) = 92.0%	**Regression 5:** Average Aircraft Inventory = 760 + 0.0624 $x_{\#3}$ + 0.0363 $x_{\#5}$ - 0.0736 $x_{\#7}$ R-Sq = 94.9% R-Sq(adj) = 94.3%
Regression 6: Average Aircraft Inventory = - 2080 + 17785 $x_{\%3}x_{\%7}$ + 0.191 $x_{\%3}x_{Total\ Maintainers}$ - 0.734 $x_{\%3}x_{\%7}x_{Total\ Maintainers}$ + 0.449 $x_{\%3}x_{\%7}x_{Total\ Maintainers}$ + 3.78 $x_{\%3}x_{\%7}x_{Crew\ Chiefs}$ - 0.000022 $x_{\%3}x_{Crew\ Chiefs}x_{Total\ Maintainers}$ R-Sq = 97.9% R-Sq(adj) = 97.3%	**Regression 6:** Average Aircraft Inventory = 1216 - 0.000220 $x_{\#5}x_{\#7}$ + 0.000054 $x_{\#9}x_{Total\ Maintainers}$ + 0.000022 $x_{\#3}x_{\#7}$ - 0.000005 $x_{\#3}x_{Total\ Maintainers}$ R-Sq = 98.4% R-Sq(adj) = 98.2%
Regression 7: Average Aircraft Inventory = 1383 - 2676 $x_{\%7}$ + 0.134 $x_{\%3}x_{\%5}x_{Total\ Maintainers}$ R-Sq = 93.7% R-Sq(adj) = 93.2%	**Regression 7:** Average Aircraft Inventory = 363 - 0.191 $x_{\#3}$ + 0.514 $x_{\#7}$ - 0.000018 $x_{\%7}x_{Total\ Maintainers}$ + 0.000000 $x_{\#5}x_{\#7}x_{Total\ Maintainers}$ + 0.000001 $x_{\#3}x_{Chiefs}$ + 0.000007 $x_{\#3}x_{Total\ Maintainers}$ R-Sq = 97.8% R-Sq(adj) = 97.3%

Flying Hours	
Percentage of Maintainers	Number of Maintainers
Regression 1: Flying Hours = - 1614929 + 1671526 % Level 3 + 1886815 % Level 5 + 1533354 % Level 7 + 2010770 % Level 9 + 0.98 chiefs - 0.660 Total Maintainers R-Sq = 50.6% R-Sq(adj) = 38.7%	**Regression 1:** Flying Hours = 101328 + 40.6 3la + 46.1 5la + 36.8 7la + 51.6 9la + 0.98 chiefs - 42.5 Total Maintainers R-Sq = 50.8% R-Sq(adj) = 39.0%
Regression 2: Flying Hours = 1733 + 237964 % Level 3 + 1101738 % Level 9 R-Sq = 26.1% R-Sq(adj) = 21.0%	**Regression 2:** Flying Hours = 60633 + 4.77 3la - 1.47 5la + 9.8 9la R-Sq = 19.1% R-Sq(adj) = 10.5
Regression 3: There were no significant correlations to any independent variables.	**Regression 3:** There were no significant correlations to any independent variables.
Regression 4: There were no significant correlations to any independent variables.	**Regression 4:** There were no significant correlations to any independent variables.
Regression 5: Flying Hours = 156736 - 425291 % Level 7 + 993478 % Level 9 R-Sq = 41.7% R-Sq(adj) = 37.7%	**Regression 5:** Flying Hours = 79568 - 10.6 7la + 25.5 9la + 1.90 Total Maintainers R-Sq = 41.8% R-Sq(adj) = 35.6%
Regression 6: Flying Hours = 146100 - 815354 c57 + 2480964 c59 R-Sq = 38.6% R-Sq(adj) = 34.4%	**Regression 6:** Flying Hours = 95069 - 0.000127 n7TM + 0.000000 n359 R-Sq = 40.7% R-Sq(adj) = 36.6%
Regression 7: Flying Hours = 100382 - 214273 % Level 7 + 11615015 c359 R-Sq = 41.9% R-Sq(adj) = 37.9%	**Regression 7:** Flying Hours = 159328 - 12.0 7la + 0.000000 n59TM R-Sq = 40.8% R-Sq(adj) = 36.7%

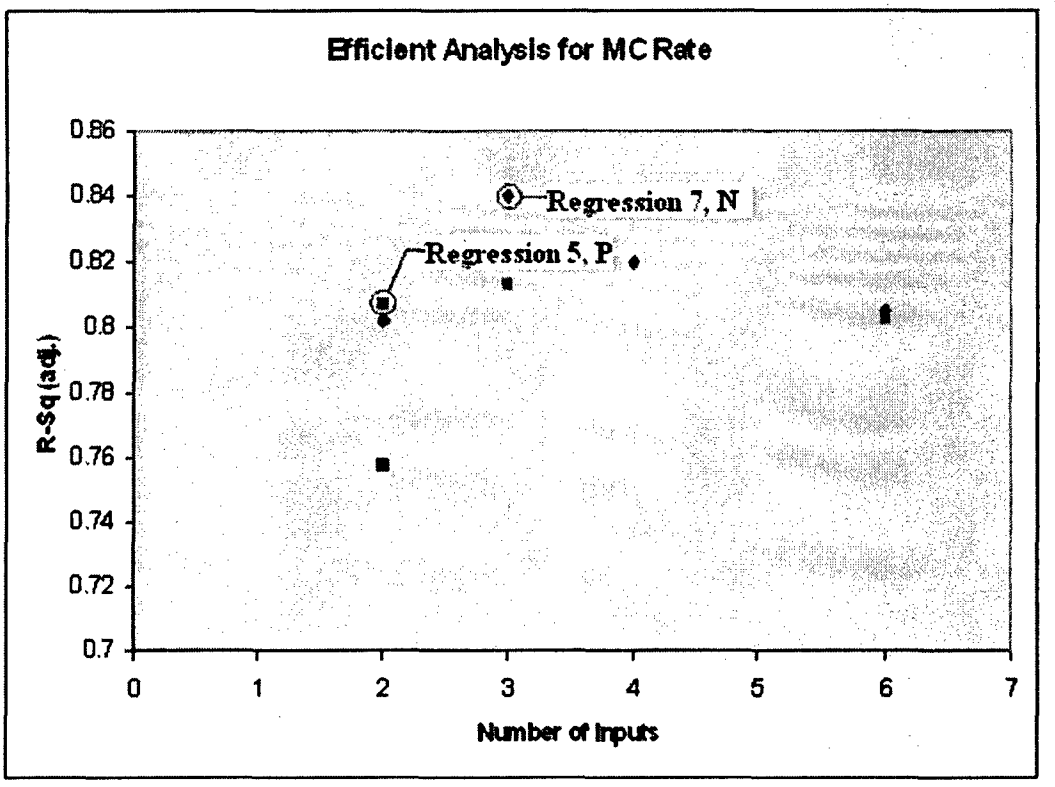
Sorties	
Percentage of Maintainers	Number of Maintainers
Regression 1: Sorties = - 1210515 + 1248957 % Level 3 + 1350273 % Level 5 + 1264888 % Level 7 + 1466219 % Level 9 + 1.03 chiefs - 0.519 Total Maintainers R-Sq = 55.9% R-Sq(adj) = 45.3%	**Regression 1:** Sorties = 69628 + 30.3 3la + 32.8 5la + 30.4 7la + 37.7 9la + 1.02 chiefs - 31.6 Total Maintainers R-Sq = 55.6% R-Sq(adj) = 44.9%
Regression 2: Sorties = - 895464 + 979795 % Level 3 + 993720 % Level 5 + 891668 % Level 7 + 1261533 % Level 9 R-Sq = 49.8% R-Sq(adj) = 42.4%	**Regression 2:** Sorties = 71139 + 28.5 3la + 30.6 5la + 28.0 7la + 36.8 9la - 29.4 Total Maintainers R-Sq = 52.9% R-Sq(adj) = 43.9%
Regression 3: There were no significant correlations to any independent variables.	**Regression 3:** There were no significant correlations to any independent variables.
Regression 4: There were no significant correlations to any independent variables.	**Regression 4:** There were no significant correlations to any independent variables.
Regression 5: Sorties = 86933 - 195985 % Level 7 + 564472 % Level 9 R-Sq = 32.9% R-Sq(adj) = 28.3%	**Regression 5:** Sorties = 68962 - 3.57 7la + 18.5 9la R-Sq = 32.6% R-Sq(adj) = 27.9%
Regression 6: Sorties = 33865 + 6624017 c39 - 11691560 c379 R-Sq = 37.1% R-Sq(adj) = 32.7%	**Regression 6:** Sorties = 52959 - 0.000045 n7TM + 0.00219 n 39 R-Sq = 35.5% R-Sq(adj) = 31.0%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** Sorties = 63508 - 2.62 7la + 0.00190 n 39 R-Sq = 34.2% R-Sq(adj) = 29.7%

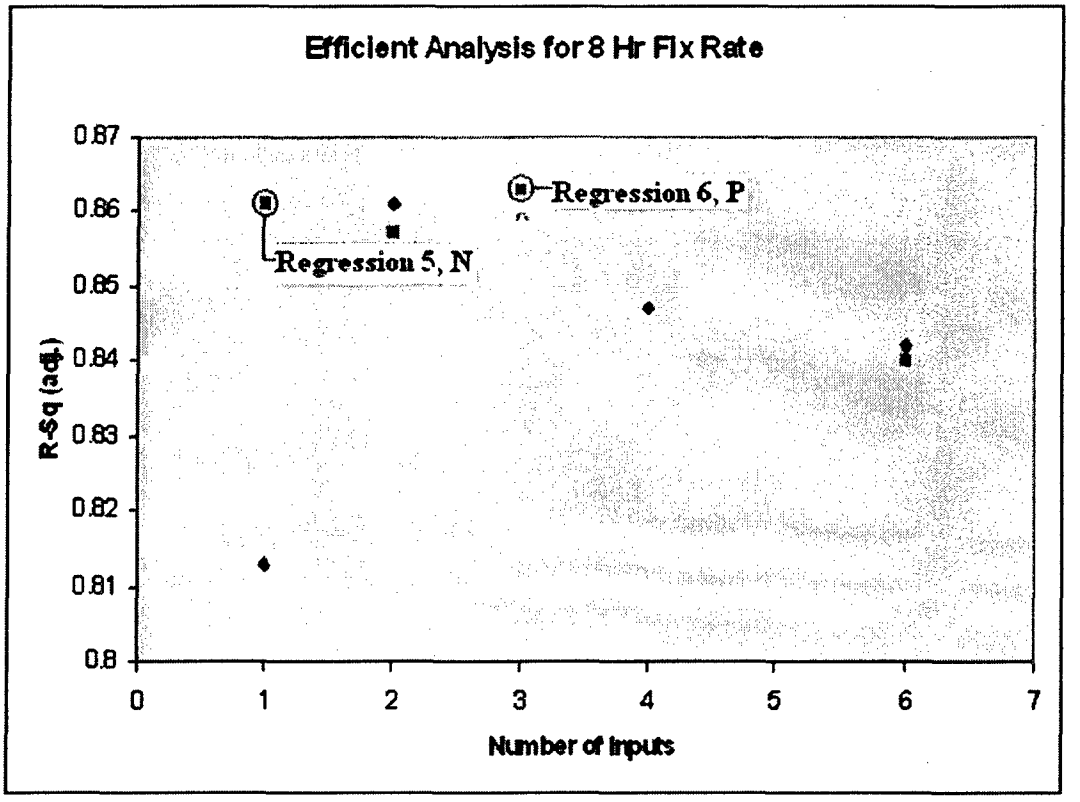
CANN Hours	
Percentage of Maintainers	Number of Maintainers
Regression 1: CANN Hours = - 843073 + 845149 $x_{\%3}$ + 973516 $x_{\%5}$ + 848245 $x_{\%7}$ + 562315 $x_{\%9}$ + 0.853 x_{Chiefs} - 0.869 $x_{Total\ Maintainers}$ R-Sq = 73.0% R-Sq(adj) = 66.5%	**Regression 1:** CANN Hours = 43445 + 22.0 x_{93} + 25.7 x_{95} + 22.5 x_{97} + 15.4 x_{99} + 0.865 x_{Chiefs} - 24.2 $x_{Total\ Maintainers}$ R-Sq = 73.3% R-Sq(adj) = 66.9%
Regression 2: CANN Hours = - 75590 + 117256 $x_{\%3}$ + 163730 $x_{\%5}$ - 0.524 $x_{Total\ Maintainers}$ R-Sq = 68.5% R-Sq(adj) = 65.1%	**Regression 2:** CANN Hours = 33436 + 2.65 x_{93} + 4.23 x_{95} - 3.26 $x_{Total\ Maintainers}$ R-Sq = 68.1% R-Sq(adj) = 64.7%
Regression 3: There were no significant correlations to any independent variables.	**Regression 3:** CANN Hours = 33857 - 2.49 x_{97} R-Sq = 66.0% R-Sq(adj) = 64.9%
Regression 4: There were no significant correlations to any independent variables.	**Regression 4:** This regression is redundant to Regression 3
Regression 5: CANN Hours = 62731 - 144793 $x_{\%7}$ - 0.446 $x_{Total\ Maintainers}$ R-Sq = 67.3% R-Sq(adj) = 65.0%	**Regression 5:** This regression is redundant to Regression 3
Regression 6: CANN Hours = 33857 - 2.49 $x_{\%7}x_{Total\ Maintainers}$ R-Sq = 66.0% R-Sq(adj) = 64.9%	**Regression 6:** CANN Hours = 48837 - 0.000244 $x_{97}x_{Total\ Maintainers}$ + 7.04E-09 $x_{95}x_{97}x_{Total\ Maintainers}$ R-Sq = 71.4% R-Sq(adj) = 69.4%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** CANN Hours = 217994 - 9.57 x_{97} + 8.42E-09 $x_{93}x_{97}x_{Total\ Maintainers}$ - 5.13 $x_{Total\ Maintainers}$ + 1.25E-07 $x_{93}x_{95}x_{99}$ R-Sq = 77.9% R-Sq(adj) = 74.6%

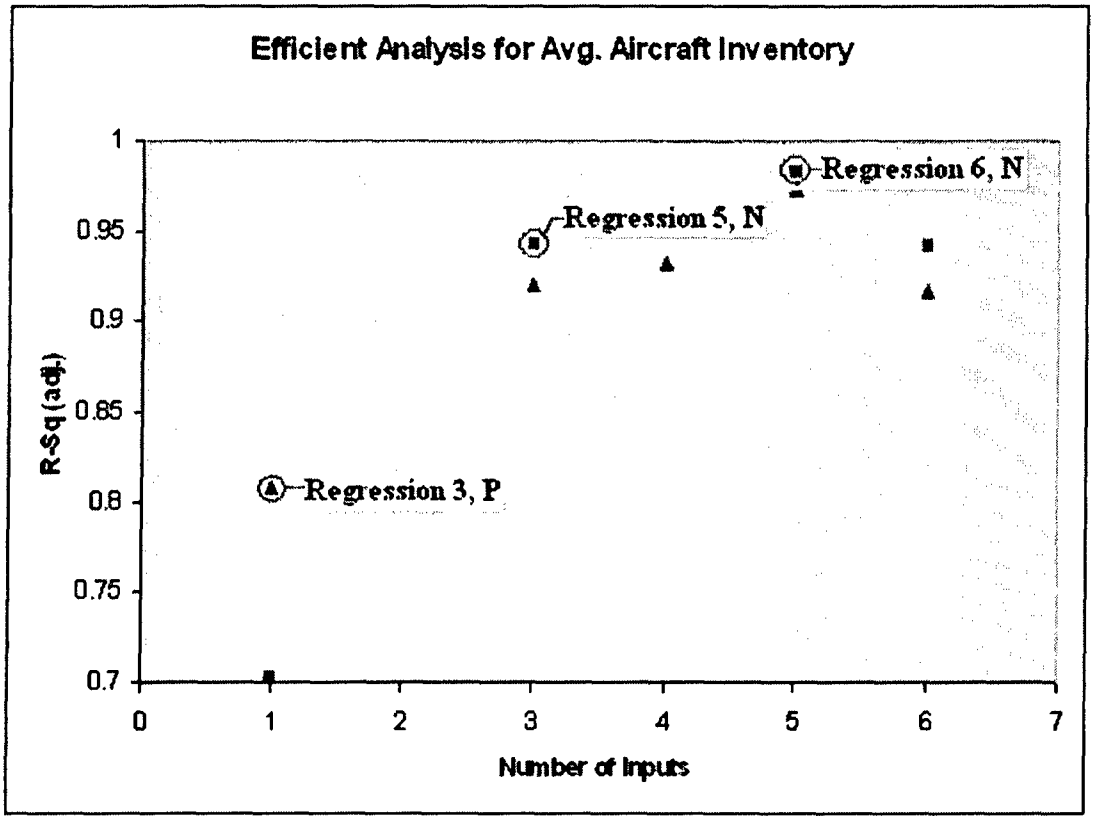
Maintenance Reliability	
Percentage of Maintainers	Number of Maintainers
Regression 1: Maintenance Reliability = - 165902 + 173690 $x_{n,3}$ + 212154 $x_{n,5}$ + 135705 $x_{n,7}$ + 70670 $x_{n,9}$ - 0.082 x_{Chief} - 0.0829 $x_{Total\ Maintainers}$ R-Sq = 91.5% R-Sq(adj) = 89.4%	**Regression 1:** Maintenance Reliability = 11115 + 4.00 x_{e3} + 4.96 x_{e5} + 3.05 x_{e7} + 1.56 x_{e9} - 0.100 x_{Chief} - 4.18 $x_{Total\ Maintainers}$ R-Sq = 91.8% R-Sq(adj) = 89.8%
Regression 2: Maintenance Reliability = - 46570 + 63124 $x_{n,3}$ + 81722 $x_{n,5}$ R-Sq = 89.3% R-Sq(adj) = 88.6%	**Regression 2:** Maintenance Reliability = 9359 + 1.40 x_{e3} + 2.07 x_{e5} - 1.37 $x_{Total\ Maintainers}$ R-Sq = 90.2% R-Sq(adj) = 89.1%
Regression 3: Maintenance Reliability = 27953 - 5174 $x_{n,3}$ - 80313 $x_{n,7}$ R-Sq = 86.8% R-Sq(adj) = 85.9%	**Regression 3:** Maintenance Reliability = 14033 - 0.699 x_{e7} R-Sq = 74.9% R-Sq(adj) = 74.0%
Regression 4: Maintenance Reliability = 24947 - 72293 $x_{n,7}$ R-Sq = 86.6% R-Sq(adj) = 86.1%	**Regression 4:** This regression is redundant to Regression 3.
Regression 5: This regression is redundant to Regression 4	**Regression 5:** Maintenance Reliability = 10284 - 1.58 x_{e7} + 0.618 x_{e5} R-Sq = 87.9% R-Sq(adj) = 87.0%
Regression 6: Maintenance Reliability = - 52919 + 276796 $x_{n,3}x_{n,7}$ - 303462 $x_{n,3}x_{n,7}$ + 404899 $x_{n,3}x_{n,5}$ R-Sq = 89.2% R-Sq(adj) = 88.0%	**Regression 6:** Maintenance Reliability = 8502 - 0.00122 $x_{e7}x_{e9}$ + 0.000542 $x_{e5}x_{e9}$ R-Sq = 89.0% R-Sq(adj) = 88.3%
Regression 7: Maintenance Reliability = 70240 - 239811 $x_{n,7}$ - 45.5 $x_{n,3}x_{Chief}$ + 183 $x_{n,3}x_{n,7}x_{Chief}$ - 1.82 $x_{n,3}x_{n,7}x_{Total\ Maintainers}$ R-Sq = 91.3% R-Sq(adj) = 90.1%	**Regression 7:** Maintenance Reliability = 16433 - 1.75 x_{e7} + 0.000010 $x_{e5}x_{Total\ Maintainers}$ R-Sq = 88.0% R-Sq(adj) = 87.2%

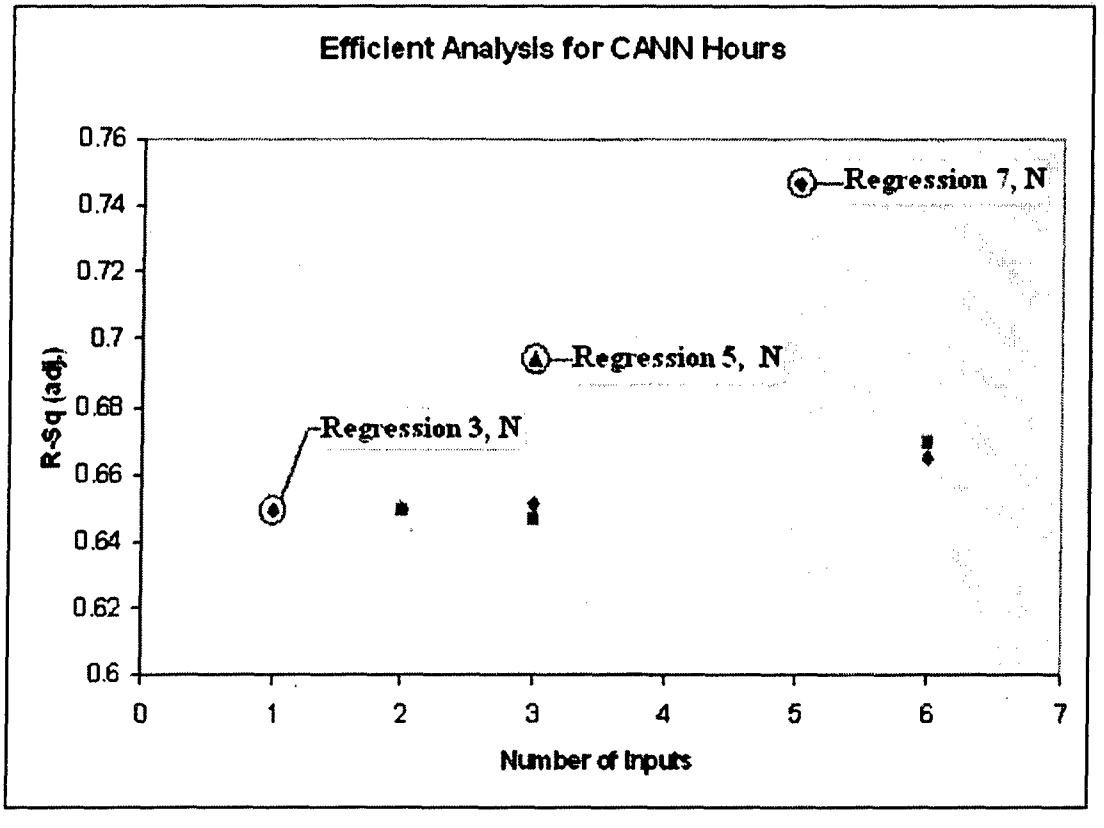
TNMCM Hours	
Percentage of Maintainers	Number of Maintainers
Regression 1: TNMCM hours = - 1322161 + 1703248 $x_{n,3}$ + 3295210 $x_{n,5}$ - 1100543 $x_{n,7}$ - 9757795 $x_{n,9}$ - 4.7 x_{Chief} + 3.53 $x_{Total\ Maintainers}$ R-Sq = 82.2% R-Sq(adj) = 77.9%	**Regression 1:** TNMCM hours = 161912 + 25 x_{e3} + 64 x_{e5} - 40 x_{e7} - 274 x_{e9} - 6.1 x_{Chief} - 16 $x_{Total\ Maintainers}$ R-Sq = 81.8% R-Sq(adj) = 77.4%
Regression 2: TNMCM hours = 663706 - 14871209 $x_{n,9}$ R-Sq = 60.7% R-Sq(adj) = 59.4%	**Regression 2:** ~~TNMCM hours = 506604 - 228 x_{e9}~~ ~~R-Sq = 59.2% R-Sq(adj) = 57.9%~~
Regression 3: TNMCM hours = 1193027 - 3812335 $x_{n,7}$ R-Sq = 72.0% R-Sq(adj) = 71.1%	**Regression 3:** There were no significant correlations to any independent variables.
Regression 4: This regression is redundant to Regression 3.	**Regression 4:** There were no significant correlations to any independent variables.
Regression 5: TNMCM hours = 187989 - 2522675 $x_{n,7}$ - 10318457 $x_{n,9}$ + 1927795 $x_{n,5}$ R-Sq = 81.2% R-Sq(adj) = 79.2%	**Regression 5:** TNMCM hours = 203028 - 297 x_{e9} + 48.6 x_{e5} - 60.7 x_{e7} R-Sq = 81.3% R-Sq(adj) = 79.2%
Regression 6: TNMCM hours = 4078913 - 2.59E+08 $x_{n,3}x_{n,9}$ - 1.29E+08 $x_{n,3}x_{n,7}$ + 2.35E+09 $x_{n,3}x_{n,7}x_{n,9}$ + 1.24E+08 $x_{n,3}x_{n,5}x_{n,7}$ - 0.000825 $x_{n,5}x_{Chief}x_{Total\ Maintainers}$ R-Sq = 87.8% R-Sq(adj) = 85.4%	**Regression 6:** TNMCM hours = 201604 - 0.0372 $x_{e7}x_{e9}$ + 0.000575 $x_{e5}x_{e7}x_{Total\ Maintainers}$ R-Sq = 79.0% R-Sq(adj) = 77.6%
Regression 7: TNMCM hours = 934842 - 2490923 $x_{n,7}$ - 2.30E+08 $x_{n,3}x_{n,7}x_{n,9}$ + 60.3 $x_{n,3}x_{n,5}x_{Total\ Maintainers}$ R-Sq = 81.4% R-Sq(adj) = 79.4%	**Regression 7:** TNMCM hours = - 178625 - 0.0366 $x_{e7}x_{e9}$ + 41.7 x_{e5} R-Sq = 80.7% R-Sq(adj) = 79.4%

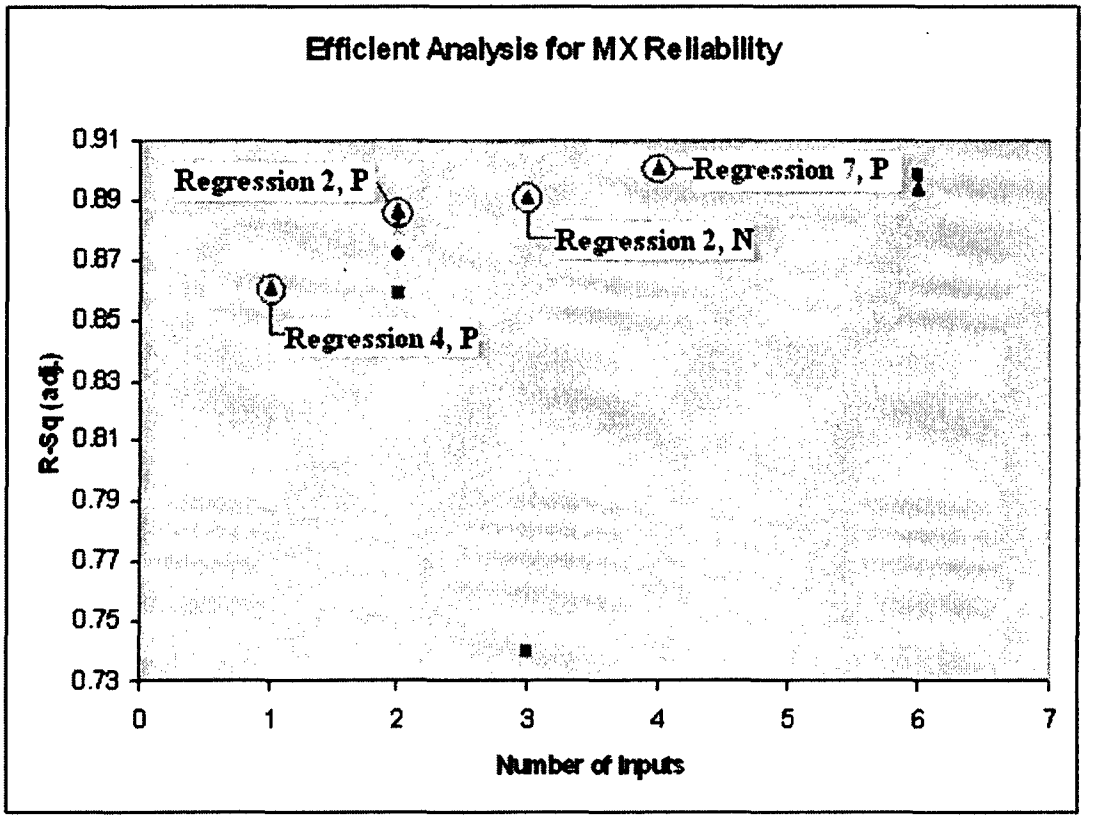
Appendix C

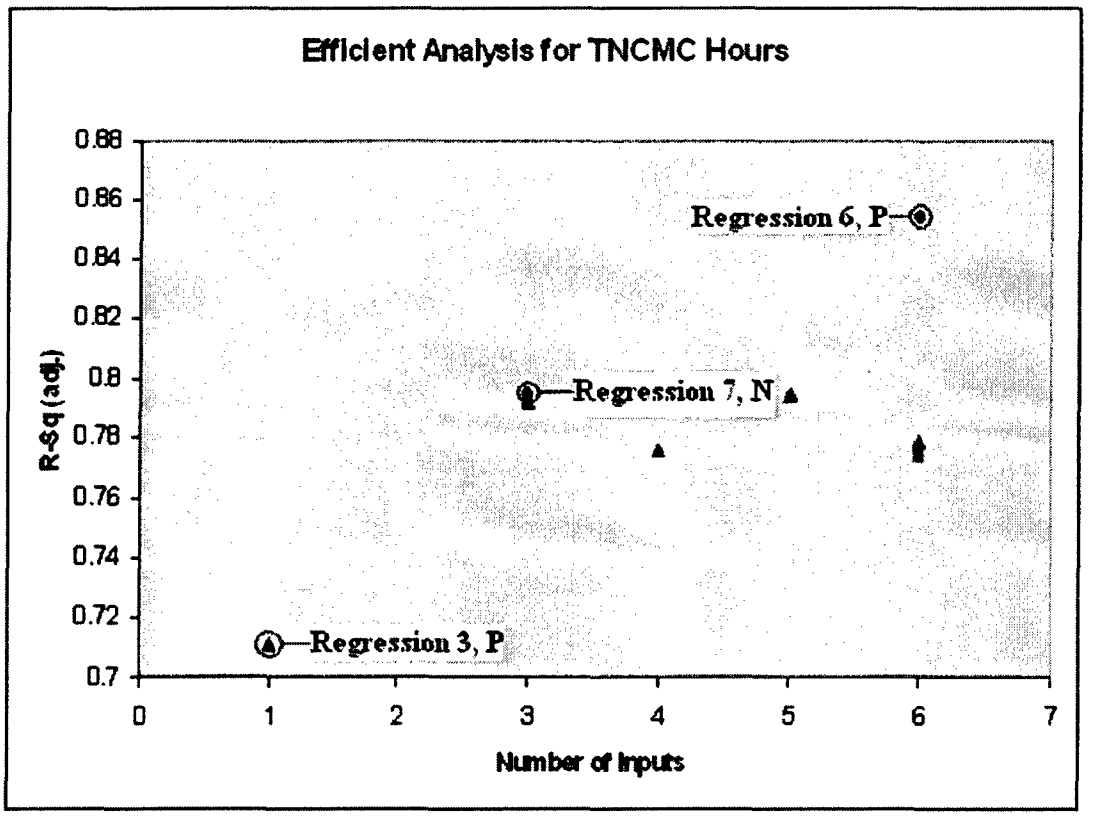

Efficient Analysis for MC Rate
R-Sq (adj.)
0.86
0.84
0.82
0.8
0.78
0.76
0.74
0.72
0.7
0
1
2
3
4
5
6
7
Number of Inputs
Regression 7, N
Regression 5, P


Efficient Analysis for 8 Hr Flx Rate
R-Sq (adj.)
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0.8
0
1
2
3
4
5
6
7
Number of Inputs
Regression 6, P
Regression 5, N


Efficient Analysis for Avg. Aircraft Inventory
1
0.95
0.9
0.85
0.8
0.75
0.7
R-Sq (adj.)
0
1
2
3
4
5
6
7
Number of Inputs
Regression 6, N
Regression 5, N
Regression 3, P


Efficient Analysis for CANN Hours
0.76
0.74
0.72
0.7
0.68
0.66
0.64
0.62
0.6
R-Sq (adj.)
0
1
2
3
4
5
6
7
Number of Inputs
Regression 7, N
Regression 5, N
Regression 3, N


Efficient Analysis for MX Reliability
0.91
0.89
0.87
0.85
0.83
0.81
0.79
0.77
0.75
0.73
R-Sq (adj)
Regression 2, P
Regression 7, P
Regression 2, N
Regression 4, P
0
1
2
3
4
5
6
7
Number of Inputs


Efficient Analysis for TNCMC Hours
0.88
0.86
0.84
0.82
0.8
0.78
0.76
0.74
0.72
0.7
R-Sq (adj)
Regression 6, P
Regression 7, N
Regression 3, P
0
1
2
3
4
5
6
7
Number of Inputs

Appendix D

Mission Capable Rate

Percentage of Maintainers	Number of Maintainers
Regression 1: MC Rate = 5.24 - 4.54 $x_{\%3}$ - 5.30$x_{\%5}$ - 4.01$x_{\%7}$ + 2.75$x_{\%9}$ - 0.000002x_{Chief} + 0.000001$x_{Total\ Maintainers}$ R-Sq = 84.3% R-Sq(adj) = 80.5%	**Regression 1:** MC Rate = 0.729 - 0.000114$x_{\#3}$ - 0.000134$x_{\#5}$ - 0.000106$x_{\#7}$ + 0.000077$x_{\#9}$ - 0.000002x_{Chiefs} + 0.000116$x_{Total\ Maintainers}$ R-Sq = 84.1% R-Sq(adj) = 80.3%
Regression 2: No variables were significant from Regression 1.	**Regression 2:** No variables have a p-value that are significant
Regression 3: MC Rate = 0.622 - 0.046$x_{\%3}$ + 26.7$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 79.6%	**Regression 3:** MC Rate = 0.699 + 8.63E-8 $x_{\#7}x_{\#9}$ R-Sq = 74.7% R-Sq(adj) = 73.9%
Regression 4: MC Rate = 0.607 + 27.6$x_{\%7}x_{\%9}$ R-Sq = 80.9% R-Sq(adj) = 80.2%	**Regression 4:** This regression is redundant to Regression 3.
Regression 5: CHOSEN MODEL MC Rate = 0.347 + 1.27 $x_{\%7}$ + 4.89 $x_{\%9}$ R-Sq = 82.0% R-Sq(adj) = 80.7%	**Regression 5:** MC Rate = 0.792 + 0.000123 $x_{\#9}$ - 0.000017$x_{\#5}$ R-Sq = 77.3% R-Sq(adj) = 75.7%
Regression 6: MC Rate = 0.639 + 42.1 $x_{\%7}x_{\%9}$ - 9.43 $x_{\%5}x_{\%9}$ R-Sq = 82.5% R-Sq(adj) = 81.3%	**Regression 6:** MC Rate = 0.650 - 6.59E -9$x_{\#3}x_{\#9}$ + 4.47E -8 $x_{\#7}x_{\#9}$ - 1.29E -12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 83.7% R-Sq(adj) = 82.0%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** MC Rate = 1.59 - 0.00236 $x_{\#9}$ - 4.68E-5 $x_{\#5}$ + 1.85E-7 $x_{\#7}x_{\#9}$ + 1.14E-7 $x_{\#5}x_{\#9}$ - 8.2E-12 $x_{\#5}x_{\#7}x_{\#9}$ R-Sq = 86.6% R-Sq(adj) = 84.0%

8-Hour Fix Rate

Percentage of Maintainers	Number of Maintainers
Regression 1: 8 Hour fix rate = 1.94 - 2.06 $x_{\%3}$ - 1.71 $x_{\%5}$ - 0.58 $x_{\%7}$ - 2.47 $x_{\%9}$ - 0.000001 x_{Chiefs} + 0.000009 $x_{Total\ Maintainers}$ R-Sq = 87.3% R-Sq(adj) = 84.2%	**Regression 1:** 8 Hour fix rate = 0.443 - 0.000056 $x_{\#3}$ - 0.000048 $x_{\#5}$ - 0.000023 $x_{\#7}$ - 0.000058 $x_{\#9}$ - 0.000001 x_{Chiefs} + 0.000052 $x_{Total\ Maintainers}$ R-Sq = 87.1% R-Sq(adj) = 84.0%
Regression 2: 8 Hour fix rate = 0.228 + 0.000015 $x_{Total\ Maintainers}$ R-Sq = 81.9% R-Sq(adj) = 81.3%	**Regression 2:** No variables have a p-value that are significant
Regression 3: 8 Hour fix rate = 0.547 - 1.47 $x_{\%3}x_{\%7}$ + 0.000036 $x_{\%7}x_{Total\ Maintainers}$ R-Sq = 86.8% R-Sq(adj) = 85.9%	**Regression 3:** 8 Hour fix rate = 0.395 - 0.000000 $x_{\#3}x_{\#7}$ + 0.000000 $x_{\#5}x_{\#9}$ + 0.000000 $x_{\#3}x_{Total\ Maintainers}$ + 0.000000 $x_{\#7}x_{Total\ Maintainers}$ - 0.000000 $x_{\#9}x_{Total\ Maintainers}$ - 0.000000 $x_{\#5}x_{\#7}x_{\#9}x_{TM}$ R-Sq = 87.7% R-Sq(adj) = 84.7%
Regression 4: 8 Hour fix rate = 0.441 + 0.000040 $x_{\%7}x_{Total\ Maintainers}$ R-Sq = 86.5% R-Sq(adj) = 86.1%	**Regression 4:** No variables have a p-value that are significant
Regression 5: 8 Hour fix rate = 0.0539 + 0.000010 $x_{Total\ Maintainers}$ + 1.53 $x_{\%7}$ R-Sq = 86.7% R-Sq(adj) = 85.7%	**Regression 5: CHOSEN MODEL** 8 Hour fix rate = 0.441 + 0.000040 $x_{\#7}$ R-Sq = 86.5% R-Sq(adj) = 86.1%
Regression 6: 8 Hour fix rate = 0.474 + 0.000072 $x_{\%5}x_{\%7}x_{Total\ Maintainers}$ R-Sq = 86.7% R-Sq(adj) = 86.3%	**Regression 6:** 8 Hour fix rate = 0.462 + 3.82E-9 $x_{\#5}x_{\#7}$ - 4.90E-14 $x_{\#5}x_{\#7}x_{Total\ Maintainers}$ R-Sq = 86.8% R-Sq(adj) = 85.9%
Regression 7: This regression is redundant to Regression 6	**Regression 7:** This regression is redundant to Regression 5.

Average Aircraft Inventory

Percentage of Maintainers	*Number of Maintainers*
Regression 1: Average Aircraft Inventory = - 984 + 3671 $x_{\%5}$ + 2757 $x_{\%6}$ - 1801 $x_{\%9}$ + 1704 $x_{\%9}$ + 0.00826 x_{Shift} + 0.0120 $x_{Total\ Maintainers}$ R-Sq = 93.3% R-Sq(adj) = 91.7%	**Regression 1:** Average Aircraft Inventory = 757 + 0.0889 $x_{\#3}$ + 0.0671 $x_{\#5}$ - 0.0408 $x_{\#7}$ + 0.0171 $x_{\#9}$ + 0.00763 x_{Shift} - 0.0302 $x_{Total\ Maintainers}$ R-Sq = 95.3% R-Sq(adj) = 94.1%
Regression 2: Average Aircraft Inventory = 1687 - 0.0100 $x_{Total\ Maintainers}$ R-Sq = 31.3% R-Sq(adj) = 29.1%	**Regression 2:** No variables have a p-value that are significant
Regression 3: Average Aircraft Inventory = 2228 - 3947 $x_{\%7}$ R-Sq = 81.4% R-Sq(adj) = 80.8%	**Regression 3:** Average Aircraft Inventory = 383 + 0.111 $x_{\#3}$ R-Sq = 71.4% R-Sq(adj) = 70.4%
Regression 4: This regression is redundant to Regression 3.	**Regression 4:** This regression is redundant to Regression 3
Regression 5: Average Aircraft Inventory = 1626 - 4685 $x_{\%7}$ + 0.0134 $x_{Total\ Maintainers}$ + 1249 $x_{\%3}$ R-Sq = 92.8% R-Sq(adj) = 92.0%	**Regression 5:** Average Aircraft Inventory = 760 + 0.0624 $x_{\#3}$ + 0.0363 $x_{\#5}$ - 0.0736 $x_{\#7}$ R-Sq = 94.9% R-Sq(adj) = 94.3%
Regression 6: Average Aircraft Inventory = - 2080 + 17785 $x_{\%3}x_{\%7}$ + 0.191 $x_{\%3}x_{Total\ Maintainers}$ - 0.734 $x_{\%3}x_{\%7}x_{Total\ Maintainers}$ + 0.449 $x_{\%3}x_{\%5}x_{Total\ Maintainers}$ + 3.78 $x_{\%3}x_{\%7}x_{Crew\ Chiefs}$ - 0.000032 $x_{\%3}x_{Crew\ Chiefs}x_{Total\ Maintainers}$ R-Sq = 97.9% R-Sq(adj) = 97.3%	**Regression 6:** Average Aircraft Inventory = 1216 - 0.000220 $x_{\#5}x_{\#7}$ + 0.000054 $x_{\#9}x_{Total\ Maintainers}$ + 0.000022 $x_{\#3}x_{\#7}$ - 0.000005 $x_{\#3}x_{Total\ Maintainers}$ R-Sq = 98.4% R-Sq(adj) = 98.2%
Regression 7: Average Aircraft Inventory = 1383 - 2676 $x_{\%7}$ + 0.134 $x_{\%3}x_{\%5}x_{Total\ Maintainers}$ R-Sq = 93.7% R-Sq(adj) = 93.2%	**Regression 7:** Average Aircraft Inventory = 363 - 0.191 $x_{\#3}$ + 0.514 $x_{\#7}$ - 0.000018 $x_{\#9}x_{Total\ Maintainers}$ + 0.000000 $x_{\#5}x_{\#7}x_{Total\ Maintainers}$ + 0.000001 $x_{\#3}x_{Shifts}$ + 0.000007 $x_{\#3}x_{Total\ Maintainers}$ R-Sq = 97.8% R-Sq(adj) = 97.3%

Sorties

Percentage of Maintainers	Number of Maintainers
Regression 1: Sorties = -1210515 + 1248967 %-Level 3 + 1350273 %-Level 5 + 1264888 %-Level 7 + 1466219 %-Level 9 + 1.03 shifts - 0.519 Total Maintainers R-Sq = 55.0% R-Sq(adj) = 45.3%	**Regression 1:** Sorties = 69628 + 30.3 $\#_{3s}$ + 32.8 $\#_{5s}$ + 30.4 $\#_{7s}$ + 37.7 $\#_{9s}$ + 1.03 shifts - 31.6 Total Maintainers R-Sq = 55.6% R-Sq(adj) = 44.9%
Regression 2: Sorties = -805464 + 979795 %-Level 3 + 901720 %-Level 5 + 891668 %-Level 7 + 1261523 %-Level 9 R-Sq = 49.8% R-Sq(adj) = 42.4%	**Regression 2:** Sorties = 71139 + 28.5 $\#_{3s}$ + 30.6 $\#_{5s}$ + 28.0 $\#_{7s}$ + 36.8 $\#_{9s}$ - 29.4 Total Maintainers R-Sq = 52.9% R-Sq(adj) = 43.9%
Regression 3: There were no significant correlations to any independent variables.	**Regression 3:** There were no significant correlations to any independent variables
Regression 4: There were no significant correlations to any independent variables.	**Regression 4:** There were no significant correlations to any independent variables.
Regression 5: Sorties = 86923 - 195985 %-Level 7 + 564472 %-Level 9 R-Sq = 32.9% R-Sq(adj) = 28.3%	**Regression 5:** Sorties = 68962 - 3.57 $\#_{7s}$ + 18.5 $\#_{9s}$ R-Sq = 32.6% R-Sq(adj) = 27.9%
Regression 6: Sorties = 33865 + 6624017 a39 - 11691560 a479 R-Sq = 27.1% R-Sq(adj) = 22.7%	**Regression 6:** Sorties = 52959 - 0.000043 n773M + 0.00219 n 39 R-Sq = 35.5% R-Sq(adj) = 31.0%
Regression 7: This regression is redundant to Regression 6.	**Regression 7:** Sorties = 63508 - 2.62 $\#_{7s}$ + 0.00190 n 39 R-Sq = 34.2% R-Sq(adj) = 29.7%

Flying Hours

Percentage of Maintainers	Number of Maintainers
Regression 1: ~~Flying Hours = - 1614929 + 1671526 % Level 2 + 1886815 % Level 8 + 1823384 % Level 7 + 2010770 % Level 9 + 0.98 chiefs - 0.660 Total Maintainers~~ ~~R-Sq = 50.6% R-Sq(adj) = 28.7%~~	**Regression 1:** ~~Flying Hours = 101328 + 40.6 3la + 46.1 5la + 36.8 7la + 51.6 9la + 0.98 chiefs - 42.6 Total Maintainers~~ ~~R-Sq = 50.8% R-Sq(adj) = 29.0%~~
Regression 2: ~~Flying Hours = 1733 + 237964 % Level 3 + 1101738 % Level 9~~ ~~R-Sq = 26.1% R-Sq(adj) = 21.0%~~	**Regression 2:** ~~Flying Hours = 60623 + 4.77 3la - 1.47 5la + 9.8 9la~~ ~~R-Sq = 19.1% R-Sq(adj) = 10.5~~
Regression 3: There were no significant correlations to any independent variables.	**Regression 3:** There were no significant correlations to any independent variables.
Regression 4: There were no significant correlations to any independent variables.	**Regression 4:** There were no significant correlations to any independent variables.
Regression 5: ~~Flying Hours = 156730 - 425291 % Level 7 + 993478 % Level 9~~ ~~R-Sq = 41.2% R-Sq(adj) = 37.2%~~	**Regression 5:** ~~Flying Hours = 79563 - 10.6 7la + 25.5 9la + 1.90 Total Maintainers~~ ~~R-Sq = 41.8% R-Sq(adj) = 35.6%~~
Regression 6: ~~Flying Hours = 146100 - $18254 e52 + 2480964 e59~~ ~~R-Sq = 38.6% R-Sq(adj) = 34.4%~~	**Regression 6:** ~~Flying Hours = 95069 - 0.000127 n7TM + 0.000000 n359~~ ~~R-Sq = 40.7% R-Sq(adj) = 36.6%~~
Regression 7: ~~Flying Hours = 100382 - 214273 % Level 7 + 1161501$ e359~~ ~~R-Sq = 41.9% R-Sq(adj) = 37.9%~~	**Regression 7:** ~~Flying Hours = 159328 - 12.0 7la + 0.000000 n50TM~~ ~~R-Sq = 40.8% R-Sq(adj) = 36.7%~~

CANN Hours

Percentage of Maintainers	Number of Maintainers
Regression 1: CANN Hours = - 843073 + 845149 $x_{e,1}$ + 973516 $x_{e,5}$ + 848245 $x_{e,7}$ + 562315 $x_{e,9}$ + 0.853 x_{Chiefs} - 0.869 $x_{Total Maintainers}$ R-Sq = 73.0% R-Sq(adj) = 66.5%	**Regression 1:** CANN Hours = 43445 + 22.0 x_{a1} + 25.7 x_{a5} + 22.5 x_{a7} + 15.4 x_{a9} + 0.865 x_{Chiefs} - 24.2 $x_{Total Maintainers}$ R-Sq = 73.3% R-Sq(adj) = 66.9%
Regression 2: CANN Hours = - 75590 + 117256 $x_{e,3}$ + 163730 $x_{e,5}$ - 0.524 $x_{Total Maintainers}$ R-Sq = 68.5% R-Sq(adj) = 65.1%	**Regression 2:** CANN Hours = 33436 + 2.65 x_{a3} + 4.23 x_{a5} - 3.26 $x_{Total Maintainers}$ R-Sq = 68.1% R-Sq(adj) = 64.7%
Regression 3: There were no significant correlations to any independent variables.	**Regression 3: CHOSEN MODEL** CANN Hours = 33857 - 2.49 x_{a7} R-Sq = 66.0% R-Sq(adj) = 64.9% ☑☑☑☑
Regression 4: There were no significant correlations to any independent variables.	**Regression 4:** This regression is redundant to Regression 3
Regression 5: CANN Hours = 62731 - 144793 $x_{e,7}$ - 0.446 $x_{Total Maintainers}$ R-Sq = 67.3% R-Sq(adj) = 65.0% ☑☑☑☑	**Regression 5:** This regression is redundant to Regression 3
Regression 6: CANN Hours = 33857 - 2.49 $x_{e,7}x_{Total Maintainers}$ R-Sq = 66.0% R-Sq(adj) = 64.9%	**Regression 6:** CANN Hours = 48837 - 0.000244 $x_{a7}x_{Total Maintainers}$ + 7.04E-09 $x_{a5}x_{a7}x_{Total Maintainers}$ R-Sq = 71.4% R-Sq(adj) = 69.4% ☑☑☑☑
Regression 7: This regression is redundant to Regression 6	**Regression 7:** CANN Hours = 217994 - 9.57 x_{a7} + 8.42E-09 $x_{a5}x_{a7}x_{Total Maintainers}$ - 5.13 $x_{Total Maintainers}$ + 1.25E-07 $x_{a3}x_{a5}x_{a9}$ R-Sq = 77.9% R-Sq(adj) = 74.6% ☑☑☑☑

Maintenance Reliability

Percentage of Maintainers	Number of Maintainers
Regression 1: Maintenance Reliability = - 165902 + 173690 $x_{s,3}$ + 212154 $x_{s,5}$ + 135705 $x_{s,7}$ + 70670 $x_{s,9}$ - 0.082 x_{Chiefs} - 0.0829 $x_{Total\ Maintainers}$ R-Sq = 91.5% R-Sq(adj) = 89.4%	**Regression 1:** Maintenance Reliability = 11115 + 4.00 $x_{s,3}$ + 4.96 $x_{s,5}$ + 3.05 $x_{s,7}$ + 1.56 $x_{s,9}$ - 0.100 x_{Chiefs} - 4.18 $x_{Total\ Maintainers}$ R-Sq = 91.8% R-Sq(adj) = 89.8%
Regression 2: Maintenance Reliability = - 46570 + 63124 $x_{s,3}$ + 81722 $x_{s,5}$ R-Sq = 89.3% R-Sq(adj) = 88.6%	**Regression 2:** Maintenance Reliability = 9359 + 1.40 $x_{s,3}$ + 2.07 $x_{s,5}$ - 1.37 $x_{Total\ Maintainers}$ R-Sq = 90.2% R-Sq(adj) = 89.1%
Regression 3: Maintenance Reliability = 27953 - 5174 $x_{s,9}$ - 80313 $x_{s,7}$ R-Sq = 86.8% R-Sq(adj) = 85.9%	**Regression 3:** Maintenance Reliability = 14033 - 0.699 $x_{s,7}$ R-Sq = 74.9% R-Sq(adj) = 74.0%
Regression 4: CHOSEN MODEL Maintenance Reliability = 24947 - 72293 $x_{s,7}$ R-Sq = 86.6% R-Sq(adj) = 86.1%	**Regression 4:** This regression is redundant to Regression 3.
Regression 5: This regression is redundant to Regression 4	**Regression 5:** Maintenance Reliability = 10284 - 1.58 $x_{s,7}$ + 0.618 $x_{s,5}$ R-Sq = 87.9% R-Sq(adj) = 87.0%
Regression 6: Maintenance Reliability = - 52919 + 276796 $x_{s,3}x_{s,7}$ - 303462 $x_{s,3}x_{s,7}$ + 404899 $x_{s,3}x_{s,5}$ R-Sq = 89.2% R-Sq(adj) = 88.0%	**Regression 6:** Maintenance Reliability = 8502 - 0.00122 $x_{s,7}x_{s,9}$ + 0.000542 $x_{s,5}x_{s,9}$ R-Sq = 89.0% R-Sq(adj) = 88.3%
Regression 7: Maintenance Reliability = 70240 - 239811 $x_{s,7}$ - 45.5 $x_{s,3}x_{Chiefs}$ + 183 $x_{s,3}x_{s,7}x_{Chiefs}$ - 1.82 $x_{s,3}x_{s,7}x_{Total\ Maintainers}$ R-Sq = 91.3% R-Sq(adj) = 90.1%	**Regression 7:** Maintenance Reliability = 16433 - 1.75 $x_{s,9}$ + 0.000010 $x_{s,5}x_{Total\ Maintainers}$ R-Sq = 88.0% R-Sq(adj) = 87.2%

TNMCM Hours

Percentage of Maintainers	Number of Maintainers
Regression 1: TNMCM hours = - 1322161 + 1703248 $x_{s,3}$ + 3295210 $x_{s,5}$ - 1100543 $x_{s,7}$ - 9757795 $x_{s,9}$ - 4.7 x_{Chiefs} + 3.53 $x_{Total\ Maintainers}$ R-Sq = 82.2% R-Sq(adj) = 77.9%	**Regression 1:** TNMCM hours = 161912 + 25 $x_{s,3}$ + 64 $x_{s,5}$ - 40 $x_{s,7}$ - 274 $x_{s,9}$ - 6.1 x_{Chiefs} - 16 $x_{Total\ Maintainers}$ R-Sq = 81.8% R-Sq(adj) = 77.4%
Regression 2: ~~TNMCM hours = 661706 - 14871209 $x_{s,9}$~~ ~~R-Sq = 59.7% R-Sq(adj) = 59.4%~~	**Regression 2:** ~~TNMCM hours = 506604 - 228 $x_{s,9}$~~ ~~R-Sq = 59.3% R-Sq(adj) = 57.9%~~
Regression 3: TNMCM hours = 1193027 - 3812335 $x_{s,7}$ R-Sq = 72.0% R-Sq(adj) = 71.1%	**Regression 3:** There were no significant correlations to any independent variables.
Regression 4: This regression is redundant to Regression 3.	**Regression 4:** There were no significant correlations to any independent variables.
Regression 5: TNMCM hours = 187989 - 2522675 $x_{s,3}$ - 10318457 $x_{s,9}$ + 1927795 $x_{s,5}$ R-Sq = 81.2% R-Sq(adj) = 79.2%	**Regression 5:** TNMCM hours = 203028 - 297 $x_{s,9}$ + 48.6 $x_{s,5}$ - 60.7 $x_{s,7}$ R-Sq = 81.3% R-Sq(adj) = 79.2%
Regression 6: TNMCM hours = 4078913 - 2.59E+08 $x_{s,5}x_{s,9}$ - 1.29E+08 $x_{s,3}x_{s,7}$ + 2.35E+09 $x_{s,3}x_{s,7}x_{s,9}$ + 1.24E+08 $x_{s,3}x_{s,5}x_{s,7}$ - 0.000825 $x_{s,5}x_{Chiefs}x_{Total\ Maintainers}$ R-Sq = 87.8% R-Sq(adj) = 85.4%	**Regression 6:** TNMCM hours = 201604 - 0.0372 $x_{s,7}x_{s,9}$ + 0.000575 $x_{s,5}x_{s,7}x_{Total\ Maintainers}$ R-Sq = 79.0% R-Sq(adj) = 77.6%
Regression 7: TNMCM hours = 934842 - 2490923 $x_{s,7}$ - 2.30E+08 $x_{s,3}x_{s,7}x_{s,9}$ + 60.3 $x_{s,3}x_{s,5}x_{Total\ Maintainers}$ R-Sq = 81.4% R-Sq(adj) = 79.4%	**Regression 7: CHOSEN MODEL** TNMCM hours = - 178625 - 0.0366 $x_{s,7}x_{s,9}$ + 41.7 $x_{s,5}$ R-Sq = 80.7% R-Sq(adj) = 79.4%

Appendix E

Dataset: Percentage of Skill Level

Regression 1: Main Effects Model

This model used simple linear regression for each dependent variable by using all the skill level variables including: percentage of level 3, 5, 7, and 9 maintainers, total crew chiefs, and total maintainers.

Regression 2: Significant Main Effects Model

Only the variables that had a p-value equal to or less than 0.05 from Regression 1 were selected for this regression.

Regression 3: Significant Correlations Model

In this model a table was constructed that showed the correlations of each dependent variable and each independent variable. Models for each of the dependent variables were constructed using only variables that had a correlation of 0.80 or greater. Interactions of the significant variables from were evaluated and any interactions that had a correlation coefficient of 0.80 or higher were used instead of the variables that constitute the interaction.

Regression 4: Significant Correlations Model using Interactions

Only the variables that had a p-value equal to or less than 0.05 from Regression 3 were selected for this regression.

Regression 5: Stepwise Main Effects Model

In this model all the main effects are included in a standard stepwise regression. No interactions are included.

Regression 6: Stepwise Main Effects Model with interactions

This model used a stepwise Regression that only included the two and three way interactions as regression variables, no main effects were used.

Regression 7: Stepwise with Main Effects and with Interactions

This model used stepwise regression with all main effects and two and three way interactions.

key:

% Level 3 = Percentage of level 3 maintainers
% Level 5 = Percentage of level 5 maintainers
% Level 7 = Percentage of level 7 maintainers
% Level 9 = Percentage of level 9 maintainers
% Chief = Percentage of crew chiefs
c35 = interaction of level 3's and level 5's
c37 = interaction of level 3's and level 7's
c39 = interaction of level 3's and level 9's
c39 = interaction of level 3's and level 9's
c3CC = interaction of level 3's and crew chiefs
c3TM = interaction of level 3's and total maintainers
c57 = interaction of level 5's and level 7's
c59 = interaction of level 5's and level 9's
c5CC = interaction of level 5's and crew chiefs
c5TM = interaction of level 5's and total maintainers
c79 = interaction of level 7's and level 9's
c7CC = interaction of level 7's and crew chiefs
c7TM = interaction of level 7's and total maintainers
c9CC = interaction of level 9's and crew chiefs
c357 = interaction of level 3's, 5's and 7's
c359 = interaction of level 3's, 5's and 9's
c35CC = interaction of level 3's, 5's and crew chiefs
c35TM = interaction of level 3's, 5's and total maintainers
c379 = interaction of level 3's, 7's and 9's
c37CC = interaction of level 3's, 7's and crew chiefs
c37TM = interaction of level 3's, 7's and total maintainers
c39CC = interaction of level 3's, 9's and crew chiefs
c39TM = interaction of level 3's, 9's and total maintainers
c3CCTM = interaction of level 3's, crew chiefs, and total maintainers
c579 = interaction of level 5's, 7's and 9's
c57CC = interaction of level 5's, 7's and crew chiefs
c57TM = interaction of level 5's, 7's and total maintainers
c59CC = interaction of level 5's, 9's and crew chiefs
c59TM = interaction of level 5's, 9's and total maintainers
c5CCTM = interaction of level 5's, crew chiefs, and total maintainers
c79CC = interaction of level 7's and 9's and crew chiefs
c79TM = interaction of level 7's, 9's and total maintainers
c7TM = interaction of level 7's and total maintainers
c7CCTM = interaction of level 7's, crew chiefs and total maintainers
c9CCTM = interaction of level 9's, crew chiefs and total maintainers

Mission Capable (MC) Rate

Regression 1:

The regression equation is
MC Rate = 5.24 - 4.54 % Level 3 - 5.30 % Level 5 - 4.01 % Level 7
+ 2.75 % Level 9 - 0.000002 chiefs + 0.000001 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	5.240	2.688	1.95	0.063
% Level 3	-4.544	2.542	-1.79	0.086
% Level 5	-5.296	2.877	-1.84	0.077
% Level 7	-4.013	2.985	-1.34	0.191
% Level 9	2.754	2.251	1.22	0.232
chiefs	-0.00000248	0.00000575	-0.43	0.670
Total Maintainers	0.00000126	0.00000217	0.58	0.566

S = 0.0133503 R-Sq = 84.3% R-Sq(adj) = 80.5%

Regression 2:

No variables have a p-value that holds significance (i.e. ≤ 0.05)

Regression 3:

The regression equation is
MC Rate = 0.622 - 0.046 % Level 3 + 26.7 c79

Predictor	Coef	SE Coef	T	P
Constant	0.6224	0.1057	5.89	0.000
% Level 3	-0.0465	0.3150	-0.15	0.884
c79	26.685	6.607	4.04	0.000

S = 0.0136719 R-Sq = 80.9% R-Sq(adj) = 79.6%

Regression 4:

The regression equation is
MC Rate = 0.607 + 27.6 c79

Predictor	Coef	SE Coef	T	P
Constant	0.60696	0.01645	36.90	0.000
c79	27.588	2.449	11.27	0.000

S = 0.0134472 R-Sq = 80.9% R-Sq(adj) = 80.2%

Regression 5:

The regression equation is
MC Rate = 0.347 + 1.27 % Level 7 + 4.89 % Level 9

Predictor	Coef	SE Coef	T	P
Constant	0.34749	0.05386	6.45	0.000
% Level 7	1.2702	0.3136	4.05	0.000
% Level 9	4.886	1.333	3.67	0.001

S = 0.0132828 R-Sq = 82.0% R-Sq(adj) = 80.7%

Regression 6:

The regression equation is
MC Rate = 0.639 + 42.1 c79 - 9.43 c59

Predictor	Coef	SE Coef	T	P
Constant	0.63897	0.02517	25.39	0.000
c79	42.104	9.126	4.61	0.000
c59	-9.427	5.721	-1.65	0.110

S = 0.0130786 R-Sq = 82.5% R-Sq(adj) = 81.3%

Regression 7:

This regression is redundant to Regression 6.

8-Hour Fix Rate

Regression 1:

The regression equation is
8-Hour fix rate = 1.94 - 2.06 % Level 3 - 1.71 % Level 5 - 0.58 % Level 7
- 2.47 % Level 9 - 0.000001 chiefs
+ 0.000009 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	1.937	3.930	0.49	0.626
% Level 3	-2.057	3.716	-0.55	0.585
% Level 5	-1.713	4.206	-0.41	0.687
% Level 7	-0.577	4.364	-0.13	0.896
% Level 9	-2.471	3.290	-0.75	0.460
chiefs	-0.00000051	0.00000840	-0.06	0.952
Total Maintainers	0.00000948	0.00000318	2.98	0.006

S = 0.0195185 R-Sq = 87.3% R-Sq(adj) = 84.2%

Regression 2:

The regression equation is
8-Hour fix rate = 0.228 + 0.000015 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	0.22771	0.05127	4.44	0.000
Total Maintainers	0.00001509	0.00000130	11.65	0.000

S = 0.0212359 R-Sq = 81.9% R-Sq(adj) = 81.3%

Regression 3:

The regression equation is
8-Hour fix rate = 0.547 - 1.47 c37 + 0.000036 c7TM

Predictor	Coef	SE Coef	T	P
Constant	0.5465	0.1373	3.98	0.000
c37	-1.472	1.874	-0.79	0.439
c7TM	0.00003609	0.00000522	6.92	0.000

S = 0.0184208 R-Sq = 86.8% R-Sq(adj) = 85.9%

Regression 4:

The regression equation is
8-Hour fix rate = 0.441 + 0.000040 c7TM

Predictor	Coef	SE Coef	T	P
Constant	0.44097	0.02770	15.92	0.000
c7TM	0.00003951	0.00000284	13.89	0.000

S = 0.0183027 R-Sq = 86.5% R-Sq(adj) = 86.1%

Regression 5:

The regression equation is
8-Hour fix rate = 0.0539 + 0.000010 Total Maintainers + 1.53 % Level 7

Predictor	Coef	SE Coef	T	P
Constant	0.05392	0.07010	0.77	0.448
Total Maintainers	0.00001002	0.00000194	5.17	0.000
% Level 7	1.5294	0.4749	3.22	0.003

S = 0.0185370 R-Sq = 86.7% R-Sq(adj) = 85.7%

Regression 6:

The regression equation is
8-Hour fix rate = 0.474 + 0.000072 c57TM

Predictor	Coef	SE Coef	T	P
Constant	0.47438	0.02512	18.88	0.000
c57TM	0.00007164	0.00000512	14.00	0.000

S = 0.0181797 R-Sq = 86.7% R-Sq(adj) = 86.3%

Regression 7:

This regression is redundant to Regression 6.

Average Aircraft Inventory

Regression 1:

The regression equation is
Average Aircraft Inventory = - 984 + 3671 % Level 3 + 2757 % Level 5
- 1801 % Level 7 + 1704 % Level 9 + 0.00826 chiefs
+ 0.0120 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-984	3052	-0.32	0.750
% Level 3	3671	2886	1.27	0.215
% Level 5	2757	3266	0.84	0.407
% Level 7	-1801	3389	-0.53	0.600
% Level 9	1704	2556	0.67	0.511
chiefs	0.008262	0.006525	1.27	0.217
Total Maintainers	0.011977	0.002467	4.85	0.000

S = 15.1592 R-Sq = 93.3% R-Sq(adj) = 91.7%

Regression 2:

The regression equation is
Average Aircraft Inventory = 1657 - 0.0100 Total Maintainers

S = 44.2840 R-Sq = 31.3% R-Sq(adj) = 29.1%

Regression 3:

The regression equation is
Average Aircraft Inventory = 2228 - 3947 % Level 7

Predictor	Coef	SE Coef	T	P
Constant	2227.88	84.30	26.43	0.000
% Level 7	-3946.8	344.4	-11.46	0.000

S = 23.0458 R-Sq = 81.4% R-Sq(adj) = 80.8%

Regression 4:

This regression would be redundant to Regression 3.

Regression 5:

The regression equation is
Average Aircraft Inventory = 1626 - 4685 % Level 7 + 0.0134 Total Maintainers
+ 1249 % Level 3

Predictor	Coef	SE Coef	T	P
Constant	1625.6	225.6	7.20	0.000
% Level 7	-4684.5	511.5	-9.16	0.000
Total Maintainers	0.013438	0.002087	6.44	0.000
% Level 3	1248.8	398.0	3.14	0.004

S = 14.8928 R-Sq = 92.8% R-Sq(adj) = 92.0%

Regression 6:

The regression equation is
Average Aircraft Inventory = - 2080 + 17785 c57 + 0.191 c5TM - 0.734 c57TM
+ 0.449 c37TM + 3.78 c37CC - 0.000022 c3CCTM

Predictor	Coef	SE Coef	T	P
Constant	-2080.5	556.9	-3.74	0.001
c57	17785	4908	3.62	0.001
c5TM	0.19136	0.02965	6.45	0.000
c57TM	-0.73424	0.09499	-7.73	0.000
c37TM	0.44938	0.07055	6.37	0.000
c37CC	3.779	1.712	2.21	0.037
c3CCTM	-0.00002183	0.00001036	-2.11	0.045

S = 8.56068 R-Sq = 97.9% R-Sq(adj) = 97.3%

Regression 7:

The regression equation is
Average Aircraft Inventory = 1383 - 2676 % Level 7 + 0.134 c35TM

Predictor	Coef	SE Coef	T	P
Constant	1382.8	123.2	11.22	0.000
% Level 7	-2675.5	265.4	-10.08	0.000
c35TM	0.13421	0.01789	7.50	0.000

S = 13.6681 R-Sq = 93.7% R-Sq(adj) = 93.2%

Flying Hours

Regression 1:

The regression equation is
Flying Hours = - 1614929 + 1671526 % Level 3 + 1886815 % Level 5
+ 1533354 % Level 7 + 2010770 % Level 9 + 0.98 chiefs
- 0.660 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-1614929	837846	-1.93	0.065
% Level 3	1671526	792353	2.11	0.045
% Level 5	1886815	896659	2.10	0.046
% Level 7	1533354	930398	1.65	0.112
% Level 9	2010770	701526	2.87	0.008
chiefs	0.984	1.791	0.55	0.588
Total Maintainers	-0.6600	0.6773	-0.97	0.339

S = 4161.32 R-Sq = 50.6% R-Sq(adj) = 38.7%

Regression 2:

The regression equation is
Flying Hours = 1733 + 237964 % Level 3 + 1101738 % Level 9

Predictor	Coef	SE Coef	T	P
Constant	1733	31707	0.05	0.957
% Level 3	237964	81990	2.90	0.007
% Level 9	1101738	599854	1.84	0.077

S = 4724.56 R-Sq = 26.1% R-Sq(adj) = 21.0%

Regression 3:

There were no significant correlations to any independent variables.

Regression 4:

There were no significant correlations to any independent variables.

Regression 5:

The regression equation is
Flying Hours = 156736 - 425291 % Level 7 + 993478 % Level 9

Predictor	Coef	SE Coef	T	P
Constant	156736	17018	9.21	0.000
% Level 7	-425291	99067	-4.29	0.000
% Level 9	993478	421048	2.36	0.025

S = 4196.72 R-Sq = 41.7% R-Sq(adj) = 37.7%

Regression 6:

The regression equation is
Flying Hours = 146100 - 815354 c57 + 2480964 c59

Predictor	Coef	SE Coef	T	P
Constant	146100	15660	9.33	0.000
c57	-815354	202876	-4.02	0.000
c59	2480964	933316	2.66	0.013

S = 4307.53 R-Sq = 38.6% R-Sq(adj) = 34.4%

Regression 7:

The regression equation is
Flying Hours = 100382 - 214273 % Level 7 + 11615015 c359

Predictor	Coef	SE Coef	T	P
Constant	100382	22449	4.47	0.000
% Level 7	-214273	63891	-3.35	0.002
c359	11615015	4881276	2.38	0.024

S = 4190.98 R-Sq = 41.9% R-Sq(adj) = 37.9%

Sorties

Regression 1:

The regression equation is
Sorties = - 1210515 + 1248957 % Level 3 + 1350273 % Level 5 + 1264888 % Level 7
+ 1466219 % Level 9 + 1.03 chiefs - 0.519 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-1210515	391620	-3.09	0.005
% Level 3	1248957	370356	3.37	0.002
% Level 5	1350273	419110	3.22	0.004
% Level 7	1264888	434880	2.91	0.008
% Level 9	1466219	327903	4.47	0.000
chiefs	1.0252	0.8373	1.22	0.232
Total Maintainers	-0.5194	0.3166	-1.64	0.113

S = 1945.06 R-Sq = 55.9% R-Sq(adj) = 45.3%

Regression 2:

The regression equation is
Sorties = - 895464 + 979795 % Level 3 + 993720 % Level 5 + 891668 % Level 7
+ 1261533 % Level 9

Predictor	Coef	SE Coef	T	P
Constant	-895464	359188	-2.49	0.019
% Level 3	979795	347567	2.82	0.009
% Level 5	993720	377167	2.63	0.014
% Level 7	891668	391213	2.28	0.031
% Level 9	1261533	309894	4.07	0.000

S = 1995.85 R-Sq = 49.8% R-Sq(adj) = 42.4%

Regression 3:

There were no significant correlations to any independent variables.

Regression 4:

There were no significant correlations to any independent variables.

Regression 5:

The regression equation is
Sorties = 86933 - 195985 % Level 7 + 564472 % Level 9

Predictor	Coef	SE Coef	T	P
Constant	86933	9028	9.63	0.000
% Level 7	-195985	52552	-3.73	0.001
% Level 9	564472	223355	2.53	0.017

S = 2226.25 R-Sq = 32.9% R-Sq(adj) = 28.3%

Regression 6:

The regression equation is
Sorties = 33865 + 6624017 c39 - 11691560 c379

Predictor	Coef	SE Coef	T	P
Constant	33865	7040	4.81	0.000
c39	6624017	1676013	3.95	0.000
c379	-11691560	6440643	-1.82	0.080

S = 2155.99 R-Sq = 37.1% R-Sq(adj) = 32.7%

Regression 7:

This regression is redundant to Regression 6.

Cannibalization (CANN) Hours

Regression 1:

The regression equation is
CANN Hours = - 843073 + 845149 % Level 3 + 973516 % Level 5 + 848245 % Level 7
+ 562315 % Level 9 + 0.853 chiefs - 0.869 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-843073	413320	-2.04	0.052
% Level 3	845149	390878	2.16	0.040
% Level 5	973516	442334	2.20	0.037
% Level 7	848245	458977	1.85	0.076
% Level 9	562315	346072	1.62	0.117
chiefs	0.8527	0.8836	0.97	0.344
Total Maintainers	-0.8687	0.3341	-2.60	0.015

S = 2052.84 R-Sq = 73.0% R-Sq(adj) = 66.5%

Regression 2:

The regression equation is
CANN Hours = - 75590 + 117256 % Level 3 + 163730 % Level 5
- 0.524 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-75590	42962	-1.76	0.089
% Level 3	117256	46430	2.53	0.017
% Level 5	163730	69132	2.37	0.025
Total Maintainers	-0.5241	0.2938	-1.78	0.085

S = 2094.51 R-Sq = 68.5% R-Sq(adj) = 65.1%

Regression 3:

There were no significant correlations to any independent variables.

Regression 4:

There were no significant correlations to any independent variables.

Regression 5:

The regression equation is
CANN Hours = 62731 - 144793 % Level 7 - 0.446 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	62731	7931	7.91	0.000
% Level 7	-144793	53724	-2.70	0.012
Total Maintainers	-0.4458	0.2194	-2.03	0.051

S = 2097.05 R-Sq = 67.3% R-Sq(adj) = 65.0%

Regression 6:

The regression equation is
CANN Hours = 33857 - 2.49 c7TM

Predictor	Coef	SE Coef	T	P
Constant	33857	3180	10.65	0.000
c7TM	-2.4927	0.3265	-7.64	0.000

S = 2101.01 R-Sq = 66.0% R-Sq(adj) = 64.9%

Regression 7:

This regression is redundant to Regression 6.

Maintenance Reliability

Regression 1:

The regression equation is
Maintenance Reliability = - 165902 + 173690 % Level 3 + 212154 % Level 5
+ 135705 % Level 7 + 70670 % Level 9 - 0.082 chiefs
- 0.0829 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-165902	61191	-2.71	0.012
% Level 3	173690	57869	3.00	0.006
% Level 5	212154	65486	3.24	0.003
% Level 7	135705	67950	2.00	0.057
% Level 9	70670	51235	1.38	0.180
chiefs	-0.0822	0.1308	-0.63	0.535
Total Maintainers	-0.08290	0.04947	-1.68	0.106

S = 303.917 R-Sq = 91.5% R-Sq(adj) = 89.4%

Regression 2:

The regression equation is
Maintenance Reliability = - 46570 + 63124 % Level 3 + 81722 % Level 5

Predictor	Coef	SE Coef	T	P
Constant	-46570	5925	-7.86	0.000
% Level 3	63124	4319	14.61	0.000
% Level 5	81722	10389	7.87	0.000

S = 315.180 R-Sq = 89.3% R-Sq(adj) = 88.6%

Regression 3:

The regression equation is
Maintenance Reliability = 27953 - 5174 % Level 3 - 80313 % Level 7

Predictor	Coef	SE Coef	T	P
Constant	27953	4258	6.56	0.000
% Level 3	-5174	6989	-0.74	0.465
% Level 7	-80313	12031	-6.68	0.000

S = 350.312 R-Sq = 86.8% R-Sq(adj) = 85.9%

Regression 4:

The regression equation is
Maintenance Reliability = 24947 - 72293 % Level 7

Predictor	Coef	SE Coef	T	P
Constant	24947	1272	19.62	0.000
% Level 7	-72293	5195	-13.91	0.000

S = 347.664 R-Sq = 86.6% R-Sq(adj) = 86.1%

Regression 5:

The regression equation is
Maintenance Reliability = 24947 - 72293 % Level 7

Predictor	Coef	SE Coef	T	P
Constant	24947	1272	19.62	0.000
% Level 7	-72293	5195	-13.91	0.000

S = 347.664 R-Sq = 86.6% R-Sq(adj) = 86.1%

Regression 6:

The regression equation is
Maintenance Reliability = - 52919 + 276796 c57 - 303462 c37 + 404899 c35

Predictor	Coef	SE Coef	T	P
Constant	-52919	24836	-2.13	0.042
c57	276796	125023	2.21	0.035
c37	-303462	54738	-5.54	0.000
c35	404899	110831	3.65	0.001

S = 323.208 R-Sq = 89.2% R-Sq(adj) = 88.0%

Regression 7:

The regression equation is
Maintenance Reliability = 70240 - 239811 % Level 7 - 45.5 c3CC + 183 c37CC
- 1.82 c37TM

Predictor	Coef	SE Coef	T	P
Constant	70240	12761	5.50	0.000
% Level 7	-239811	48190	-4.98	0.000
c3CC	-45.45	13.28	-3.42	0.002
c37CC	183.33	54.81	3.35	0.002
c37TM	-1.8179	0.9143	-1.99	0.057

S = 294.348 R-Sq = 91.3% R-Sq(adj) = 90.1%

Total Not Mission Capable for Maintenance (TNMCM) Hours

Regression 1:

The regression equation is
TNMCM hours = - 1322161 + 1703248 % Level 3 + 3295210 % Level 5
- 1100543 % Level 7 - 9757795 % Level 9 - 4.7 chiefs
+ 3.53 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	-1322161	5105032	-0.26	0.798
% Level 3	1703248	4827842	0.35	0.727
% Level 5	3295210	5463383	0.60	0.552
% Level 7	-1100543	5668954	-0.19	0.848
% Level 9	-9757795	4274430	-2.28	0.031
chiefs	-4.74	10.91	-0.43	0.668
Total Maintainers	3.527	4.127	0.85	0.401

S = 25355.1 R-Sq = 82.2% R-Sq(adj) = 77.9%

Regression 2:

The regression equation is
TNMCM hours = 663706 - 14871209 % Level 9

Predictor	Coef	SE Coef	T	P
Constant	663706	59508	11.15	0.000
% Level 9	-14871209	2185659	-6.80	0.000

S = 34412.5 R-Sq = 60.7% R-Sq(adj) = 59.4%

Regression 3:

The regression equation is
TNMCM hours = 1193027 - 3812335 % Level 7

Predictor	Coef	SE Coef	T	P
Constant	1193027	106159	11.24	0.000
% Level 7	-3812335	433692	-8.79	0.000

S = 29021.5 R-Sq = 72.0% R-Sq(adj) = 71.1%

Regression 4:

This regression would be redundant to Regression 3.

Regression 5:

Response is TNMCM hours on 6 predictors, with N = 32
The regression equation is
TNMCM hours = 187989 - 2522675 % Level 7 - 10318457 % Level 9
+ 1927795 % Level 5

Predictor	Coef	SE Coef	T	P
Constant	187989	331639	0.57	0.575
% Level 7	-2522675	586701	-4.30	0.000
% Level 9	-10318457	2930701	-3.52	0.001
% Level 5	1927795	674671	2.86	0.008

S = 24616.1 R-Sq = 81.2% R-Sq(adj) = 79.2%

Regression 6:

The regression equation is
TNMCM hours = 4078913 - 2.59E+08 c59 - 1.29E+08 c37 + 2.35E+09 c379
+ 1.24E+08 c357 - 0.000825 c5CCTM

Predictor	Coef	SE Coef	T	P
Constant	4078913	1608633	2.54	0.018
c59	-259452242	83007589	-3.13	0.004
c37	-129429544	25800856	-5.02	0.000
c379	2349338965	803367108	2.92	0.007
c357	123623915	24312703	5.08	0.000
c5CCTM	-0.0008252	0.0004270	-1.93	0.064

S = 20598.1 R-Sq = 87.8% R-Sq(adj) = 85.4%

Regression 7:

The regression equation is
TNMCM hours = 934842 - 2490923 % Level 7 - 2.30E+08 c379 + 60.3 c35TM

Predictor	Coef	SE Coef	T	P
Constant	934842	221784	4.22	0.000
% Level 7	-2490923	555633	-4.48	0.000
c379	-229988749	62905704	-3.66	0.001
c35TM	60.26	33.20	1.81	0.080

S = 24482.2 R-Sq = 81.4% R-Sq(adj) = 79.4%

Dataset: Total Number of Skill Levels

Regression 1: Main Effects Model

This model used simple linear regression for each dependent variable by using all the skill level variables including: number of level 3, 5, 7, and 9 maintainers, number of crew chiefs, and total maintainers.

Regression 2: Significant Main Effects Model

Only the variables that had a p-value equal to or less than 0.05 from Regression 1 were selected for this regression.

Regression 3: Significant Correlations Model

In this model a table was constructed that showed the correlations of each dependent variable and each independent variable. Models for each of the dependent variables were constructed using only variables that had a correlation of 0.80 or greater. Interactions of the significant variables from were evaluated and any interactions that had a correlation coefficient of 0.80 or higher were used instead of the variables that constitute the interaction.

Regression 4: Significant Correlations Model using Interactions

Only the variables that had a p-value equal to or less than 0.05 from Regression 3 were selected for this regression.

Regression 5: Stepwise Main Effects Model

In this model all the main effects are included in a standard stepwise regression. No interactions are included.

Regression 6: Stepwise Main Effects Model with interactions

This model used a stepwise Regression that only included the two and three way interactions as regression variables, no main effects were used.

Regression 7: Stepwise with Main Effects and with Interactions

This model used stepwise regression with all main effects and two and three way interactions.

key:

3la = Number of level 3 maintainers
3la = Number of level 5 maintainers
3la = Number of level 7 maintainers
3la = Number of level 9 maintainers
Chiefs = Number of crew chiefs
n35 = interaction of level 3's and level 5's
n37 = interaction of level 3's and level 7's
n39 = interaction of level 3's and level 9's
n39 = interaction of level 3's and level 9's
n3CC = interaction of level 3's and crew chiefs
n3TM = interaction of level 3's and total maintainers
n57 = interaction of level 5's and level 7's
n59 = interaction of level 5's and level 9's
n5CC = interaction of level 5's and crew chiefs
n5TM = interaction of level 5's and total maintainers
n79 = interaction of level 7's and level 9's
n7CC = interaction of level 7's and crew chiefs
n7TM = interaction of level 7's and total maintainers
n9CC = interaction of level 9's and crew chiefs
n357 = interaction of level 3's, 5's and 7's
n359 = interaction of level 3's, 5's and 9's
n35CC = interaction of level 3's, 5's and crew chiefs
n35TM = interaction of level 3's, 5's and total maintainers
n379 = interaction of level 3's, 7's and 9's
n37CC = interaction of level 3's, 7's and crew chiefs
n37TM = interaction of level 3's, 7's and total maintainers
n39CC = interaction of level 3's, 9's and crew chiefs
n39TM = interaction of level 3's, 9's and total maintainers
n3CCTM = interaction of level 3's, crew chiefs, and total maintainers
n579 = interaction of level 5's, 7's and 9's
n57CC = interaction of level 5's, 7's and crew chiefs
n57TM = interaction of level 5's, 7's and total maintainers
n59CC = interaction of level 5's, 9's and crew chiefs
n59TM = interaction of level 5's, 9's and total maintainers
n5CCTM = interaction of level 5's, crew chiefs, and total maintainers
n79CC = interaction of level 7's and 9's and crew chiefs
n79TM = interaction of level 7's, 9's and total maintainers
n7TM = interaction of level 7's and total maintainers
n7CCTM = interaction of level 7's, crew chiefs and total maintainers
n9CCTM = interaction of level 9's, crew chiefs and total maintainers

Mission Capable (MC) Rate

Regression 1:

The regression equation is
MC Rate = 0.729 - 0.000114 3la - 0.000134 5la - 0.000106 7la + 0.000077 9la
- 0.000002 chiefs + 0.000116 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	0.72878	0.08335	8.74	0.000
3la	-0.00011417	0.00006231	-1.83	0.079
5la	-0.00013421	0.00006993	-1.92	0.066
7la	-0.00010582	0.00007263	-1.46	0.158
9la	0.00007651	0.00005918	1.29	0.208
chiefs	-0.00000193	0.00000575	-0.34	0.739
Total Maintainers	0.00011612	0.00006734	1.72	0.097

S = 0.0134291 R-Sq = 84.1% R-Sq(adj) = 80.3%

Regression 2:

No variables have a p-value that adds significance

Regression 3:

The regression equation is
MC Rate = 0.699 + 0.000000 n79

Predictor	Coef	SE Coef	T	P
Constant	0.69894	0.01009	69.29	0.000
n79	0.00000001	0.00000000	9.41	0.000

S = 0.0154671 R-Sq = 74.7% R-Sq(adj) = 73.9%

Regression 4:

This regression would be redundant to Regression 3.

Regression 5:

The regression equation is
MC Rate = 0.792 + 0.000123 9la - 0.000017 3la

Predictor	Coef	SE Coef	T	P
Constant	0.79219	0.07465	10.61	0.000
9la	0.00012292	0.00001745	7.05	0.000
3la	-0.00001692	0.00000793	-2.13	0.042

S = 0.0149000 R-Sq = 77.3% R-Sq(adj) = 75.7%

Regression 6:

The regression equation is
MC Rate = 0.650 - 0.000000 n 39 + 0.000000 n79 - 0.000000 n579

Predictor	Coef	SE Coef	T	P
Constant	0.64981	0.03064	21.21	0.000
n 39	-0.00000001	0.00000000	-1.52	0.139
n79	0.00000004	0.00000001	4.73	0.000
n579	-0.00000000	0.00000000	-3.62	0.001

S = 0.0128407 R-Sq = 83.7% R-Sq(adj) = 82.0%

Regression 7:

The regression equation is
MC Rate = 1.59 - 0.00236 91a - 0.000047 51a + 0.000000 n79 + 0.000000 n59
- 0.000000 n579

Predictor	Coef	SE Coef	T	P
Constant	1.5901	0.5472	2.91	0.007
91a	-0.002359	0.001042	-2.26	0.032
51a	-0.00004677	0.00002911	-1.61	0.120
n79	0.00000018	0.00000006	3.27	0.003
n59	0.00000011	0.00000006	2.06	0.050
n579	-0.00000000	0.00000000	-2.81	0.009

S = 0.0121131 R-Sq = 86.6% R-Sq(adj) = 84.0%

8-Hour Fix Rate

Regression 1:

The regression equation is
8-Hour fix rate = 0.443 - 0.000056 3la - 0.000048 5la - 0.000023 7la
- 0.000058 9la - 0.000001 chiefs + 0.000052 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	0.4433	0.1218	3.64	0.001
3la	-0.00005579	0.00009106	-0.61	0.546
5la	-0.0000478	0.0001022	-0.47	0.644
7la	-0.0000226	0.0001061	-0.21	0.833
9la	-0.00005811	0.00008648	-0.67	0.508
chiefs	-0.00000062	0.00000840	-0.07	0.942
Total Maintainers	0.00005212	0.00009840	0.53	0.601

S = 0.0196245 R-Sq = 87.1% R-Sq(adj) = 84.0%

Regression 2:

No variables have a p-value that are significant

Regression 3:

The regression equation is
8-Hour fix rate = 0.395 - 0.000000 n57 + 0.000000 n59 + 0.000000 n5TM
+ 0.000000 n7TM - 0.000000 n9TM - 0.000000 n579TM

Predictor	Coef	SE Coef	T	P
Constant	0.3946	0.1723	2.29	0.031
n57	-0.00000001	0.00000001	-0.85	0.401
n59	0.00000016	0.00000012	1.30	0.205
n5TM	0.00000000	0.00000000	1.12	0.274
n7TM	0.00000000	0.00000000	0.57	0.576
n9TM	-0.00000004	0.00000003	-1.23	0.230
n579TM	-0.00000000	0.00000000	-1.26	0.219

S = 0.0191834 R-Sq = 87.7% R-Sq(adj) = 84.7%

Regression 4:

No variables have a p-value that are significant

Regression 5:

The regression equation is
8-Hour fix rate = 0.441 + 0.000040 71a

Predictor	Coef	SE Coef	T	P
Constant	0.44097	0.02770	15.92	0.000
71a	0.00003951	0.00000284	13.89	0.000

S = 0.0183027 R-Sq = 86.5% R-Sq(adj) = 86.1%

Regression 6:

8-Hour fix rate = 8-Hour fix rate = 0.462 + 3.82E-9 n57 - 4.90E-14 n57TM

Predictor	Coef	SE Coef	T	P
Constant	0.46249	0.09539	4.85	0.000
n57	0.00000000	0.00000000	2.13	0.042
n57TM	-0.00000000	0.00000000	-1.50	0.145

S = 0.0184114 R-Sq = 86.8% R-Sq(adj) = 85.9%

Regression 7:

This regression is redundant to Regression 5.

Average Aircraft Inventory

Regression 1:

Average Aircraft Inventory = 757 + 0.0889 3la + 0.0671 5la - 0.0408 7la
+ 0.0171 9la + 0.00763 chiefs
- 0.0302 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	757.23	79.09	9.57	0.000
3la	0.08891	0.05913	1.50	0.145
5la	0.06709	0.06635	1.01	0.322
7la	-0.04076	0.06891	-0.59	0.559
9la	0.01709	0.05615	0.30	0.763
chiefs	0.007628	0.005455	1.40	0.174
Total Maintainers	-0.03022	0.06389	-0.47	0.640

S = 12.7419 R-Sq = 95.3% R-Sq(adj) = 94.1%

Regression 2:

No variables have a p-value that are significant

Regression 3:

The regression equation is
Average Aircraft Inventory = 383 + 0.111 3la

Predictor	Coef	SE Coef	T	P
Constant	383.1	101.8	3.76	0.001
3la	0.11108	0.01284	8.65	0.000

S = 28.5898 R-Sq = 71.4% R-Sq(adj) = 70.4%

Regression 4:

This regression would be redundant to Regression 3.

Regression 5:

The regression equation is
Average Aircraft Inventory = 760 + 0.0624 31a - 0.0736 71a + 0.0363 51a

Predictor	Coef	SE Coef	T	P
Constant	760.03	68.07	11.17	0.000
31a	0.062350	0.007142	8.73	0.000
71a	-0.073593	0.007115	-10.34	0.000
51a	0.036314	0.004395	8.26	0.000

S = 12.5142 R-Sq = 94.9% R-Sq(adj) = 94.3%

Regression 6:
The regression equation is
Average Aircraft Inventory = 1216 - 0.000220 n57 + 0.000054 n9TM + 0.000022 n 37
- 0.000005 n 3TM

Predictor	Coef	SE Coef	T	P
Constant	1215.94	35.12	34.62	0.000
N79	-0.00021956	0.00002666	-8.24	0.000
n9TM	0.00005393	0.00000663	8.13	0.000
n 37	0.00002220	0.00000440	5.04	0.000
n 3TM	-0.00000524	0.00000117	-4.47	0.000

S = 7.13102 R-Sq = 98.4% R-Sq(adj) = 98.2%

Regression 7:

The regression equation is
Average Aircraft Inventory = 363 - 0.191 31a + 0.514 71a - 0.000018 n7TM
+ 0.000000 n57TM + 0.000001 n 3CC + 0.000007 n 3TM

Predictor	Coef	SE Coef	T	P
Constant	363.0	340.6	1.07	0.297
31a	-0.19096	0.02671	-7.15	0.000
71a	0.5139	0.1183	4.34	0.000
n7TM	-0.00001774	0.00000350	-5.06	0.000
n57TM	0.00000000	0.00000000	4.65	0.000
n 3CC	0.00000109	0.00000046	2.38	0.025
n 3TM	0.00000721	0.00000076	9.48	0.000

S = 8.60584 R-Sq = 97.8% R-Sq(adj) = 97.3%

Flying Hours

Regression 1:

The regression equation is
Flying Hours = 101328 + 40.6 3la + 46.1 5la + 36.8 7la + 51.6 9la + 0.98 chiefs
- 42.5 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	101328	25764	3.93	0.001
3la	40.64	19.26	2.11	0.045
5la	46.11	21.61	2.13	0.043
7la	36.81	22.45	1.64	0.114
9la	51.57	18.29	2.82	0.009
chiefs	0.977	1.777	0.55	0.587
Total Maintainers	-42.46	20.81	-2.04	0.052

S = 4150.94 R-Sq = 50.8% R-Sq(adj) = 39.0%

Regression 2:

The regression equation is
Flying Hours = 60633 + 4.77 3la - 1.47 5la + 9.8 9la

Predictor	Coef	SE Coef	T	P
Constant	60633	26794	2.26	0.032
3la	4.771	2.758	1.73	0.095
5la	-1.473	1.468	-1.00	0.324
9la	9.75	15.01	0.65	0.521

S = 5030.69 R-Sq = 19.1% R-Sq(adj) = 10.5

Regression 3:

There were no significant correlations to any independent variables.

Regression 4:

There were no significant correlations to any independent variables.

Regression 5:

The regression equation is
Flying Hours = 79568 - 10.6 71a + 25.5 91a + 1.90 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	79568	19772	4.02	0.000
71a	-10.578	2.866	-3.69	0.001
91a	25.46	12.89	1.98	0.058
Total Maintainers	1.902	1.079	1.76	0.089

S = 4266.95 R-Sq = 41.8% R-Sq(adj) = 35.6%

Regression 6:

The regression equation is
Flying Hours = 95069 - 0.000127 n7TM + 0.000000 n359

Predictor	Coef	SE Coef	T	P
Constant	95069	4115	23.10	0.000
n7TM	-0.00012728	0.00003125	-4.07	0.000
n359	0.00000020	0.00000006	3.26	0.003

S = 4231.93 R-Sq = 40.7% R-Sq(adj) = 36.6%

Regression 7:

The regression equation is
Flying Hours = 159328 - 12.0 71a + 0.000000 n59TM

Predictor	Coef	SE Coef	T	P
Constant	159328	20193	7.89	0.000
71a	-11.962	3.255	-3.68	0.001
n59TM	0.00000004	0.00000001	3.09	0.004

S = 4229.13 R-Sq = 40.8% R-Sq(adj) = 36.7%

Regression 1:

The regression equation is
Sorties = 69628 + 30.3 3la + 32.8 5la + 30.4 7la + 37.7 9la + 1.02 chiefs
- 31.6 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	69628	12111	5.75	0.000
3la	30.327	9.054	3.35	0.003
5la	32.76	10.16	3.22	0.004
7la	30.37	10.55	2.88	0.008
9la	37.684	8.599	4.38	0.000
chiefs	1.0176	0.8353	1.22	0.235
Total Maintainers	-31.561	9.784	-3.23	0.003

S = 1951.20 R-Sq = 55.6% R-Sq(adj) = 44.9%

Regression 2:

The regression equation is
Sorties = 71139 + 28.5 3la + 30.6 5la + 28.0 7la + 36.8 9la
- 29.4 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	71139	12159	5.85	0.000
3la	28.536	9.017	3.16	0.004
5la	30.60	10.10	3.03	0.005
7la	28.00	10.47	2.67	0.013
9la	36.787	8.646	4.25	0.000
Total Maintainers	-29.422	9.714	-3.03	0.005

S = 1969.28 R-Sq = 52.9% R-Sq(adj) = 43.9%

Regression 3:

There were no significant correlations to any independent variables.

Regression 4:

There were no significant correlations to any independent variables.

Regression 5:

The regression equation is
Sorties = 68962 - 3.57 71a + 18.5 91a

Predictor	Coef	SE Coef	T	P
Constant	68962	4083	16.89	0.000
71a	-3.568	1.015	-3.51	0.001
91a	18.470	6.455	2.86	0.008

S = 2231.98 R-Sq = 32.6% R-Sq(adj) = 27.9%

Regression 6:

The regression equation is
Sorties = 52959 - 0.000045 n7TM + 0.00219 n 39

Predictor	Coef	SE Coef	T	P
Constant	52959	2786	19.01	0.000
n7TM	-0.00004465	0.00001131	-3.95	0.000
n 39	0.0021855	0.0006782	3.22	0.003

S = 2183.72 R-Sq = 35.5% R-Sq(adj) = 31.0%

Regression 7:

The regression equation is
Sorties = 63508 - 2.62 71a + 0.00190 n 39

Predictor	Coef	SE Coef	T	P
Constant	63508	3356	18.92	0.000
71a	-2.6188	0.6818	-3.84	0.001
n 39	0.0019027	0.0006295	3.02	0.005

S = 2204.06 R-Sq = 34.2% R-Sq(adj) = 29.7%

Cannibalization (CANN) Hours

Regression 1:

The regression equation is
CANN Hours = 43445 + 22.0 31a + 25.7 51a + 22.5 71a + 15.4 91a + 0.865 chiefs
- 24.2 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	43445	12666	3.43	0.002
31a	22.013	9.469	2.32	0.028
51a	25.66	10.63	2.42	0.023
71a	22.49	11.04	2.04	0.052
91a	15.376	8.992	1.71	0.100
chiefs	0.8646	0.8736	0.99	0.332
Total Maintainers	-24.23	10.23	-2.37	0.026

S = 2040.57 R-Sq = 73.3% R-Sq(adj) = 66.9%

Regression 2:

The regression equation is
CANN Hours = 33436 + 2.65 31a + 4.23 51a - 3.26 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	33436	11554	2.89	0.007
31a	2.648	1.108	2.39	0.024
51a	4.235	1.846	2.29	0.029
Total Maintainers	-3.263	1.066	-3.06	0.005

S = 2105.91 R-Sq = 68.1% R-Sq(adj) = 64.7%

Regression 3:

The regression equation is
CANN Hours = 33857 - 2.49 71a

Predictor	Coef	SE Coef	T	P
Constant	33857	3180	10.65	0.000
71a	-2.4927	0.3265	-7.64	0.000

S = 2101.01 R-Sq = 66.0% R-Sq(adj) = 64.9%

Regression 4:

This regression would be redundant to Regression 3.

Regression 5:

The regression equation is
CANN Hours = 33857 - 2.49 71a

Predictor	Coef	SE Coef	T	P
Constant	33857	3180	10.65	0.000
71a	-2.4927	0.3265	-7.64	0.000

S = 2101.01 R-Sq = 66.0% R-Sq(adj) = 64.9%

Regression 6:

The regression equation is
CANN Hours = 48837 - 0.000244 n7TM + 7.04E-09 n57TM

Predictor	Coef	SE Coef	T	P
Constant	48837	8814	5.54	0.000
n7TM	-0.00024359	0.00007227	-3.37	0.002
n57TM	0.00000001	0.00000000	2.86	0.008

S = 1960.59 R-Sq = 71.4% R-Sq(adj) = 69.4%

Regression 7:

The regression equation is
CANN Hours = 217994 - 9.57 71a + 8.42E-09 n57TM - 5.13 Total Maintainers
+ 1.25E-07 n359

Predictor	Coef	SE Coef	T	P
Constant	217994	51742	4.21	0.000
71a	-9.573	2.201	-4.35	0.000
n57TM	0.00000001	0.00000000	3.65	0.001
Total Maintainers	-5.126	1.595	-3.21	0.003
n359	0.00000012	0.00000005	2.48	0.020

S = 1785.89 R-Sq = 77.9% R-Sq(adj) = 74.6%

Regression 1:

The regression equation is
Maintenance Reliability = 11115 + 4.00 3la + 4.96 5la + 3.05 7la + 1.56 9la
- 0.100 chiefs - 4.18 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	11115	1851	6.00	0.000
3la	4.005	1.384	2.89	0.008
5la	4.964	1.553	3.20	0.004
7la	3.046	1.613	1.89	0.071
9la	1.564	1.315	1.19	0.245
chiefs	-0.1003	0.1277	-0.79	0.439
Total Maintainers	-4.176	1.496	-2.79	0.010

S = 298.292 R-Sq = 91.8% R-Sq(adj) = 89.8%

Regression 2:

The regression equation is
Maintenance Reliability = 9359 + 1.40 3la + 2.07 5la - 1.37 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	9359	1691	5.53	0.000
3la	1.3955	0.1622	8.60	0.000
5la	2.0652	0.2702	7.64	0.000
Total Maintainers	-1.3722	0.1561	-8.79	0.000

S = 308.284 R-Sq = 90.2% R-Sq(adj) = 89.1%

Regression 3:

The regression equation is
Maintenance Reliability = 14033 - 0.699 7la

Predictor	Coef	SE Coef	T	P
Constant	14033.5	720.5	19.48	0.000
7la	-0.69891	0.07396	-9.45	0.000

S = 475.996 R-Sq = 74.9% R-Sq(adj) = 74.0%

Regression 4:

This regression would be redundant to Regression 3.

Regression 5:

The regression equation is
Maintenance Reliability = 10284 - 1.58 71a + 0.618 51a

Predictor	Coef	SE Coef	T	P
Constant	10284.3	844.0	12.19	0.000
71a	-1.5793	0.1665	-9.49	0.000
51a	0.6178	0.1109	5.57	0.000

S = 336.478 R-Sq = 87.9% R-Sq(adj) = 87.0%

Regression 6:

The regression equation is
Maintenance Reliability = 8502 - 0.00122 n79 + 0.000542 n59

Predictor	Coef	SE Coef	T	P
Constant	8501.7	316.3	26.88	0.000
n79	-0.0012219	0.0001478	-8.26	0.000
n59	0.00054153	0.00008280	6.54	0.000

S = 319.834 R-Sq = 89.0% R-Sq(adj) = 88.3%

Regression 7:

The regression equation is
Maintenance Reliability = 16433 - 1.75 71a + 0.000010 n5TM

Predictor	Coef	SE Coef	T	P
Constant	16432.5	661.7	24.83	0.000
71a	-1.7469	0.1932	-9.04	0.000
n5TM	0.00000982	0.00000174	5.63	0.000

S = 334.566 R-Sq = 88.0% R-Sq(adj) = 87.2%

Total Not Mission Capable for Maintenance (TNMCM) Hours

Regression 1:

The regression equation is
TNMCM hours = 161912 + 25 3la + 64 5la - 40 7la - 274 9la - 6.1 chiefs
- 16 Total Maintainers

Predictor	Coef	SE Coef	T	P
Constant	161912	159361	1.02	0.319
3la	24.8	119.1	0.21	0.837
5la	63.6	133.7	0.48	0.639
7la	-40.5	138.9	-0.29	0.773
9la	-273.7	113.1	-2.42	0.023
chiefs	-6.07	10.99	-0.55	0.586
Total Maintainers	-16.3	128.7	-0.13	0.900

S = 25674.8 R-Sq = 81.8% R-Sq(adj) = 77.4%

Regression 2:

The regression equation is
TNMCM hours = 506604 - 228 9la

Predictor	Coef	SE Coef	T	P
Constant	506604	37729	13.43	0.000
9la	-228.48	34.61	-6.60	0.000

S = 35042.8 R-Sq = 59.2% R-Sq(adj) = 57.9%

Regression 3:

There were no significant correlations to any independent variables.

Regression 4:

There were no significant correlations to any independent variables.

Regression 5:

The regression equation is
TNMCM hours = 203028 - 297 9la + 48.6 5la - 60.7 7la

Predictor	Coef	SE Coef	T	P
Constant	203028	76966	2.64	0.013
9la	-297.49	76.22	-3.90	0.001
5la	48.612	8.686	5.60	0.000
7la	-60.71	13.95	-4.35	0.000

S = 24593.3 R-Sq = 81.3% R-Sq(adj) = 79.2%

Regression 6:

The regression equation is
TNMCM hours = 201604 - 0.0372 n79 + 0.000575 n5TM

Predictor	Coef	SE Coef	T	P
Constant	201604	45850	4.40	0.000
N79	-0.037159	0.004991	-7.45	0.000
n5TM	0.0005746	0.0001181	4.87	0.000

S = 25549.9 R-Sq = 79.0% R-Sq(adj) = 77.6%

Regression 7:

The regression equation is
TNMCM hours = - 178625 - 0.0366 n79 + 41.7 5la

Predictor	Coef	SE Coef	T	P
Constant	-178625	111980	-1.60	0.122
n79	-0.036580	0.004494	-8.14	0.000
5la	41.657	7.851	5.31	0.000

S = 24528.6 R-Sq = 80.7% R-Sq(adj) = 79.4%